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ABSTRACT

Project ABLE, a systems approach to occupational education, was conducted (1) to demonstrate increased effectiveness of instruction whose content is derived from analysis of desired behaviors after graduation and (2) to apply newly developed educational technology to the design, conduct, and evaluation of vocational education. Several procedures were established to accomplish project objectives, including methods for defining educational objectives, deriving course content, individualizing instruction, measuring student achievement, and evaluating program results. Despite several problems, especially budgetary limitations, Project ABLE has made major contributions in terms of potential national significance and application in the areas of individualized instruction, student evaluation, and program evaluation. Before the effectiveness of the instruction can be demonstrated, all system components must be completed, a field test population of adequate size must be used, and a longitudinal study of an adequate number of graduates must be conducted. Recommendations and selected references are listed, and several project materials are appended, including brief summaries of the 18 previous technical reports. (SB)

FINAL REPORT

PROJECT ABLE

DEVELOPMENT AND EVALUATION OF AN EXPERIMENTAL CURRICULUM FOR THE NEW QUINCY (MASS.) VOCATIONAL-TECHNICAL SCHOOL

U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

September 30, 1970

Project ABLE

DEVELOPMENT AND EVALUATION OF AN EXPERIMENTAL CURRICULUM FOR THE NEW QUINCY (MASS.) VOCATIONAL-TECHNICAL SCHOOL

FINAL REPORT

Project No. 5-0009
Contract No. OE-5-85-019

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September 30, 1970

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U. S. DEPARTMENT OF
HEALTH, EDUCATION AND WELFARE

Office of Education
National Center for Educational
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TABLE OF CONTENTS

List of Figures

LIST OF ATTACHMENTS

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30. Response Letters from Field Experts in Review of ABLE Documents.

FOREWORD

The initial proposal submitted by the American Institutes for Research and the Quincy Public Schools stated that, "The final report of the project may be expected to require one or more volumes. . . ." However, the recently completed Fifteenth Technical Report, "Management and Evaluation Plan for Instructional Systems Development for Vocational-Technical Education" and similar documents on the "Power Mechanics Curriculum" and the "General Woodworking Core Curriculum" were too voluminous to be included as a part of a final report. These and other ABLE documents are, therefore, reviewed in the Appendices and offered as Attachments. Most such documents have been supplied to the Educational Resources Information Center (ERIC) as authorized by the United States Office of Education (USOE) Contract Officer. Thus, descriptions of development and information and data on curriculum evaluation for each of the major curriculum areas under development have been submitted through separate documents. Completion of the Fifteenth Technical Report and implementation of the procedures reported therein, constituted accomplishment of several major project goals. Therefore, a review and critique of the management and evaluation plan were requested of consultants with the reports being included in the Appendices of this report. Since most of the items included in the List of Attachments have been widely disseminated, only one complete set is included with the required 15 copies of the Final Report for USOE. Such materials are available to interested readers from the American Institutes for Research at the cost of printing.

ACKNOWLEDGMENT

During the 1964-65 school year, several prominent educators planned and initiated Project ABLE. Included were: Robert E. Pruitt, then Superintendent of the Quincy Public Schools; Maurice J. Daly, Assistant Superintendent for Vocational and Technical Education, Quincy Public Schools; Dr. Robert M. Gagné, then Director of Research, American Institutes for Research (AIR); and John C. Flanagan, President, AIR. Dr. Gagné was principal investigator during the early stages of project activity. The design which the initiators established for ABLE is accepted by many as a model for all vocational-technical education.

Personnel changes over the term of the five-year project have resulted in the involvement of many other persons in project planning and policy guidance. The operational problems such persons have faced in meeting the goals and the challenge provided by the initiators merit acknowledgment. The present members of the ABLE Policy Board have devoted many hours to the project. Included are: Dr. Lawrence P. Creedon, Superintendent, Quincy Public Schools; William L. Phinney, Assistant Superintendent of Instruction; and Maurice J. Daly, Assistant Superintendent for Vocational and Technical Education. Their AIR counterparts are Dr. Melvin H. Rudov, Director of the Pittsburgh AIR office, and Dr. Victor J. Cieutat, Director of International Studies.

Mr. Glen E. Neifing, an AIR Associate Research Scientist, is to be acknowledged for his assistance in the preparation of this report. Many other persons of the Quincy and AIR staffs have contributed much time and effort through both full- and part-time assignments. At one time, the combined Quincy-AIR Project ABLE staff included over 30 professional staff members. A listing of many such persons was included in the attachments to the Eighth Quarterly Technical Report, March 1967.

PROJECT ABSTRACT

Project ABLE

USOE Project No. 5-0009
Contract No. OE-5-85-019

A Joint Research Project of: Public Schools of Quincy, Massachusetts and American Institutes for Research

Title: DEVELOPMENT AND EVALUATION OF AN EXPERIMENTAL CURRICULUM FOR THE NEW QUINCY (MASS.) VOCATIONAL-TECHNICAL SCHOOL

Objectives: The principal goal of the project is to demonstrate increased effectiveness of instruction whose content is explicitly derived from analysis of desired behavior after graduation and which, in addition, attempts to apply newly developed educational technology to the design, conduct, and evaluation of vocational education. Included in this new technology are methods of defining educational objectives, deriving topical content for courses, preparation of students in prerequisite knowledges and attitudes, individualizing instruction, measuring student achievement, and establishing a system for evaluating program results in terms of outcomes following graduation.

Procedure: The procedure begins with the collection of vocational information for representative jobs in eleven different vocational areas. Analysis will then be made of the performances required for job execution, resulting in descriptions of essential classes of performance which need to be learned. On the basis of this information, a panel of educational and vocational scholars will develop recommended objectives for a vocational curriculum which incorporates the goals of (1) vocational competence; (2) responsible citizenship; and (3) individual self-fulfillment. A curriculum will then be designed in topic form to provide for comprehensiveness and also flexibility of coverage for each of the vocational areas. Guidance programs and prerequisite instruction to prepare junior high students will also be designed. Selection of instructional materials, methods, and aids, and design of materials, when required, will also be undertaken. An important step will be the development of performance measures tied to the objectives of instruction. Methods of instruction will be devised to make possible individualized student progression and selection of alternative programs, and teacher-training materials will be developed to accomplish inservice teacher education of Quincy School personnel. A plan will be developed for conducting program evaluation not only in terms of end-of-year examinations, but also in terms of continuing follow-up of outcomes after graduation.

FINAL REPORT SUMMARY

Project ABLE

USOE Project No. 5-0009
Contract No. PE-5-85-019

The major curriculum areas have been reviewed in considerable detail in separately submitted interim technical reports. The Fifteenth Technical Report provided the management and evaluation plan while meeting several of the secondary project goals. A list of attachments is included in the final report to delineate the major reports and curriculum products of the project. Most of such items have been submitted to the Educational Resources Information Center (ERIC).

The goals of the project can be summarized as follows:

I. Demonstrate, as the principal goal, increased effectiveness of instruction whose content is explicitly derived from analysis of desired behavior after graduation.

II. Apply newly developed educational technology to the design, conduct, and evaluation of vocational education.

   A. Use methods of defining educational objectives that derive topical content for courses.

   B. Prepare students in the prerequisite knowledges and attitudes needed in vocational education.

   C. Individualize instruction.

   D. Measure student achievement.

   E. Establish a system for evaluating the program results in terms of outcomes following graduation.

A number of problems were encountered by the project. It was felt that the analysis, in itself, of problem areas can be an important outcome or product of innovative experimentation (and therefore appropriate for review in the final report). Interim reports (summarized briefly) presented the major details of technical development and procedures. It was concluded that most of the stated subordinate goals were accomplished within the various scope-of-work modifications. Budgetary limitations prevented the undertaking and completion of all curriculum areas originally committed. Assessment of the major goal will require completion of all system components, a field test population of adequate size, and a longitudinal study in which an adequate number of graduates are involved. It was concluded that a massive effort would be required to come to grips with the kinds of problems it was hoped ABLE could solve. The recommendations section details a plan on how such an effort should be undertaken.

INTRODUCTION

Individualized Instructional Systems for Vocational Education

During the early 1960's, a growing concern was being expressed among educators over the apparent inability of the public schools to apply newly developed educational technology. It was during this time that behavioral objectives, individualized instruction, systems development techniques, new methods of curriculum evaluation, curricular organizations based on hierarchies of skills and knowledges, and other popular themes were also gaining a hearing within the professional literature. Vocational and technical educators were among those pressing for innovation, as evidenced by the Federal legislation of 1963. Out of such concerns grew Project ABLE--a unique developmental effort which involved a local school system, the Quincy Public Schools, and a major research organization, the American Institutes for Research (AIR), in a joint contract with the U. S. Office of Education (USOE). The five-year contract with USOE was recently completed, with continuation presently being sponsored by Quincy. However, a coordinated effort to apply the results and recommendations of Project ABLE on a national scale has been under consideration by a consortium of 21 of the largest school systems in the country. It now appears that the early efforts of Project ABLE may well be of some significance to all of vocational and technical education. (See Recommendations section in the Fifteenth Technical Report.)

Project ABLE is a "systems" approach to occupational education. It was intended to base development upon a unique combination of the most effective features of modern educational technology. This included an appropriate use of the state-of-the-arts in vocational-technical education, drawing on some of the best existing methods. It also included realization that the operational instructional systems must be within the financial capabilities of most vocational-technical schools. Thus, the characteristics of the ABLE approach should find wide acceptance among vocational and technical educators. Based upon

widespread reactions from about the country (see response letters in Attachment 30) a "model" may well emerge. If the research was appropriately conducted, such should be the outcome. Here, it would be important to point out that the features of ABLE are not unique to the Quincy-AIR project. The "bandwagon" has a rapidly proliferating list of advocates and practitioners.

The flow chart depicted in Figure 1 is a graphic presentation of some major goals of Project ABLE. An extensive listing of suggested major and subordinate goals was provided in Appendix A of the Fifteenth Technical Report. The second chart, Figure 2, portrays the major requirements of an individualized instructional system of the type conceived for Project ABLE. It is doubtful that any school system at this time is at the operational stage of "individualized instruction." However, progress toward such goals is rapidly taking place. The third chart, Figure 3, plots the learner activity process within an individualized instructional system (an operational component of present ABLE programs). Note the flexibility available to individual schools, teachers, and students in the choice of instruction--methods and materials--available through the student-instructor contract options. Such an approach may well be the only effective means of meeting the problems associated with the wide variance in individual learning styles and preferences while maintaining local control over the instructional process.

At the time of the preparation of this report, the major goals and objectives as depicted in Figure 1, had not yet, of course, been achieved. In fact, as the developmental problems became evident in this new and ambitious undertaking, steps were taken, with the cooperation of USOE, to scale down the size of the commitment. Over a period of several years, pilot programs emerged as a result of steps taken to place problem solving and development on a more manageable basis. A number of curricula were prepared and implemented. (See List of Attachments for Technical Reports on specific areas of development.) Others are now nearing completion with continuation of work toward the major goals (even now more firmly embraced by Quincy) being sponsored

GOALS FOR VOCATIONAL – TECHNICAL EDUCATION

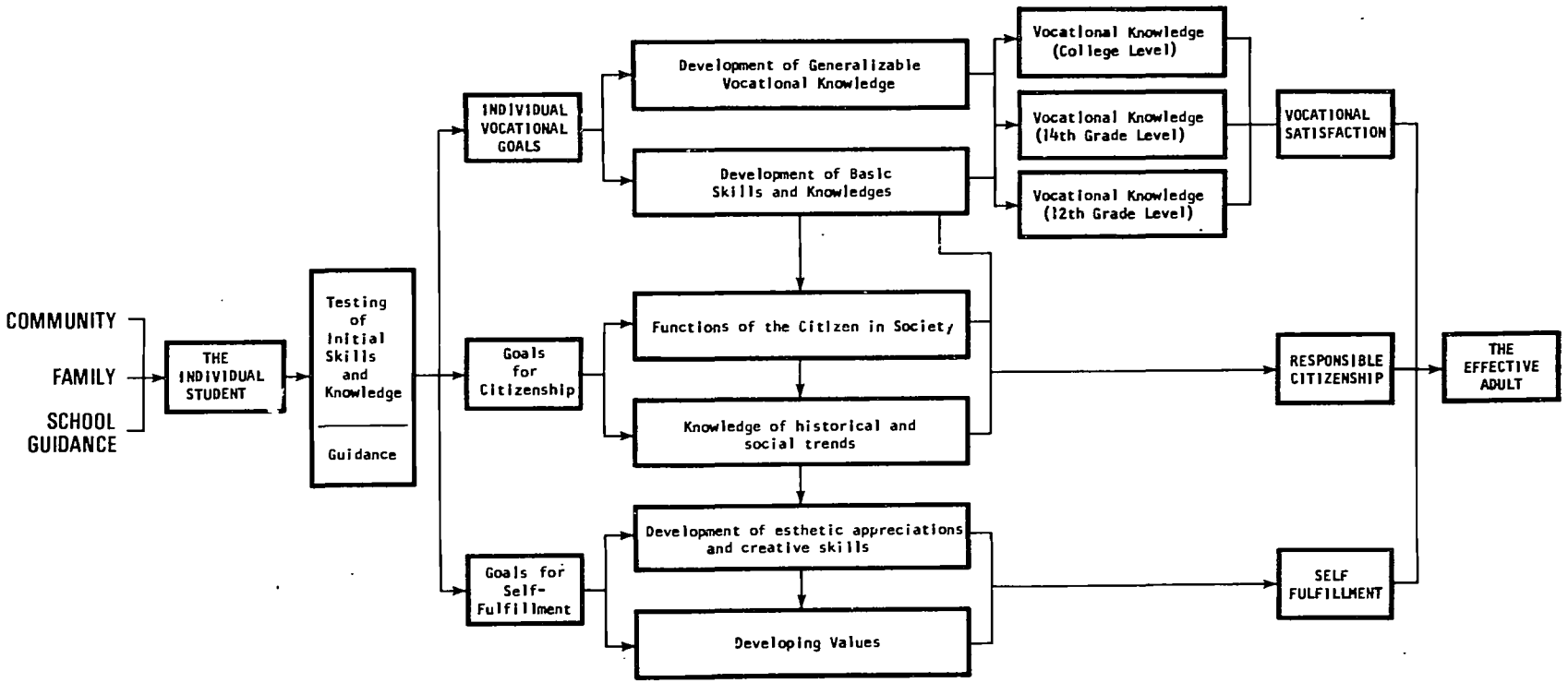

Figure 1.

Project ABLE
R. E. Pruitt

DO YOU HAVE A LEARNER–CENTERED INSTRUCTIONAL SYSTEM FOR VOCATIONAL AND TECHNICAL EDUCATION?

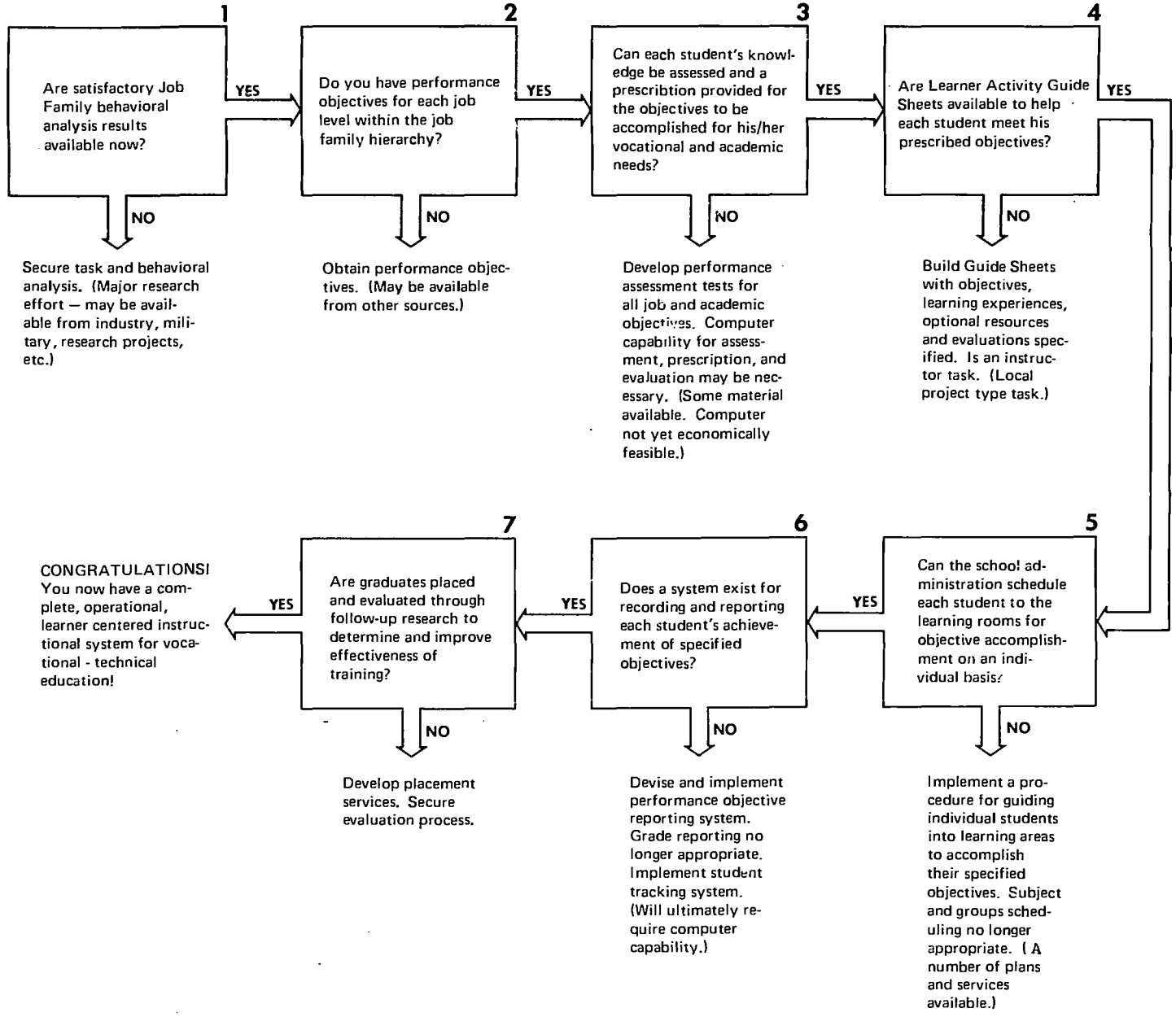

Figure 2.

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INDIVIDUALIZED LEARNER ACTIVITY PROCESS WITHIN AN INSTRUCTIONAL SYSTEM

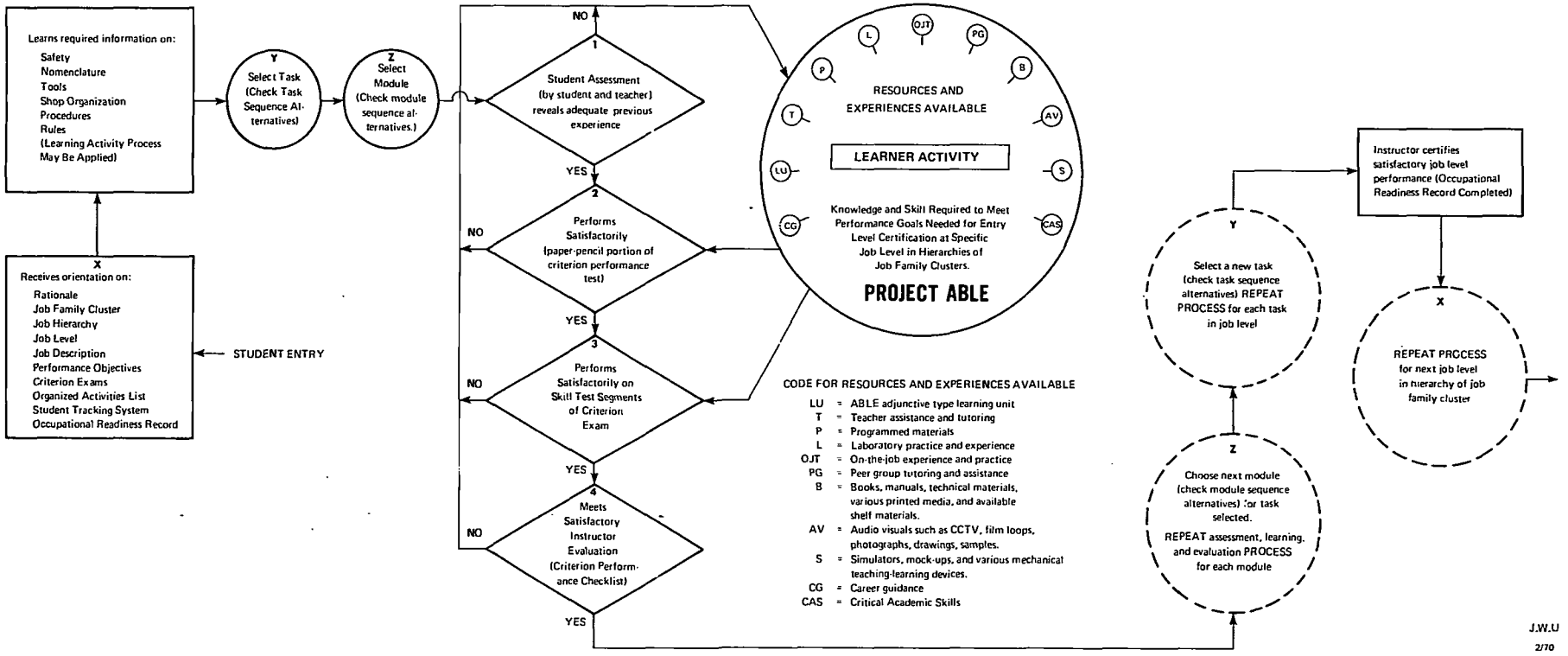

Figure 3.

by Quincy with assistance from the State of Massachusetts for the 1970-71 school year. Thus, Project ABLE has concentrated on building various critical components--components which must be operationalized and tested if the total system is ever to become a reality. And the major components are the learner-centered instructional systems.

Below are listed a number of characteristics of a modern instructional system which should typify, in the opinion of many scientists and educators, all of vocational and technical education. Project ABLE has attempted to work within such a design in the establishment of demonstration programs.

Characteristics

Individualized instruction--each student

Enters chosen job family program at a level corresponding to his previous experience and knowledge.

Is guided to learning experiences consistent with goals agreed upon by him and his instructor.

Learns at a rate based on his own ability by using self-instructional materials and techniques.

Has greater flexibility in allowing for a change of program with fewer penalties.

Experiences successes in learning--there are no failures. Some students simply take longer than others to accomplish goals.

New roles for teachers and students

The teacher is more able to perform as a diagnostician, tutor, and manager of learning.

The instructor is free to assist the individual student with accomplishment of the student's goals and in accordance with his needs.

Students participate in the selection of learning materials from a variety of educational media.

Each student is required to be actively involved in not only the learning process, but his evaluation and program management.

There is student and teacher involvement in program development and testing.

Job-based instructional units

Detailed job analyses are used to determine needed skills.

Jobs are organized into clusters and skill families.

Brief performance evaluation tests and learning activity guides are developed for each task within the occupational family.

New methods of sequencing instruction by job levels and hierarchies of skills and knowledges are used.

Clearly stated performance objectives are based on a scientific task analysis.

The focus is on job entry level skills and knowledges by job levels within a family cluster.

There are no age or grade level restrictions to programs organized by job levels.

Units are activity and job-oriented rather than classroom or theory-oriented.

At whatever point the student chooses to leave he does so with job-related proficiencies.

Students know the standards of performance and the nature of all evaluation.

Students know exactly where to concentrate remedial study.

Flexibility

Better integration of cooperative work-study programs.

Use of existing or new course materials possible.

Programs of study which can be easily modified to fit the unique needs of any school system or student.

Changes more easily accomplished with technological advances in job family (evaluation and management plan).

Student advancement by job levels (not grade levels) with multiple entry and exit points.

Performance Evaluation

Provides self-evaluation tools, preventing premature formal testing, while saving teacher time and student embarrassment.

Standards are derived from a task analysis.

Test structure informs student where to concentrate any remedial study.

Students are permitted to skip instructional units by simply demonstrating an adequate level of knowledge and skill.

Occupational readiness certification specifies skills of graduates.

Testing procedures provide students with immediate "knowledge of results."

Performance standards are provided for instructional staff.

Some Anticipated Benefits

Students build self-confidence through successful learning experiences (especially important for slow learners).

Fewer discipline problems (50% fewer in one instance).

Fewer dropouts.

Greater flexibility for students desiring a change of program of study.

Marketable job-related skills for every student.

Greater dignity for the student; no failures combined with a joint student-teacher learning effort in objective accomplishment.

Evaluation methods (student, teacher, program) economical and simple for students, teachers, and administrators.

Minimal instructor training to operate system with emphasis and focus on inservice training.

Systems techniques and better management with quality control throughout the developmental process and ongoing operation.

Reduction of clerical chores for teachers.

More easily adapted to new school-wide flexible scheduling systems.

Efficiency and cost savings in equipment and supplies because of the detailed specification of instructional objectives.

Ability to specify to publishers precise instructional objectives for better learning material development.

Instructional Example

1. A student enters the study of a particular job family in light of his present skills and interests.

2. He is provided a brief activity guide for each job task giving him

   a. a clear statement of what he should be able to do.

   b. a suggested guide to optional learning experiences (also methods, media, materials, etc.).

   c. self-evaluation aids to check his own progress.

3. He follows the guide, obtaining from the teacher counsel and advice as necessary. Team approaches, where students help each other, are frequently used. He does not work in a vacuum all alone.

4. When he feels competent to perform the unit task requirements, he goes to the teacher who evaluates his task performance and knowledges according to a guide provided to both student and teacher. (There are no secret test items; the student is told at the outset what abilities he will have to demonstrate.) If the student has had job experience and can demonstrate the required level of skills and knowledges, he can bypass most of the instruction and move rapidly to more advanced tasks.

5. If he demonstrates competence, the student and teacher select the next task to be learned. In view of his experience and interests, he may shift goals within a job family or even change job families. The modules are short and related to job tasks providing flexibility for such changes at any time.

6. The student moves along as rapidly as he is ABLE, not in lock-step with other students. He moves at a pace at which he can be successful.

Questions And Answers

Q. Do such programs seek to standardize vocational education everywhere?

A. No. An ABLE-type project permits flexibility in both the choice of program and the choice of teaching materials, more readily than any other system. The rigor is in the method of job analysis and quality control procedures in systems development.

Q. Should it involve the preparation of the instructional materials itself (texts, films, tapes, etc.)?

A. No. Not unless absolutely necessary. The learning experience used for developing a particular behavior is the option of the student and teacher in light of available school materials and opportunities. Such projects should provide references and options to materials which could be used. The system permits complete freedom and flexibility in the choice of any learning materials or methods (for readers and non-readers) which will help in the accomplishment of unit objectives for each student. Such research projects should identify topics where improved materials are needed, especially audio-visual materials. Publishers should then be encouraged to build materials to fit the precisely-stated instructional objectives. This should result in more supervision and control by school systems over the materials being marketed by educational publishers.

Q. Would cooperating school systems have to adopt the same series of modules as specified by the parent project?

A. No. Schools can recombine the task related modules into other job groupings where desired. Any teacher can select individual units to be used to teach specific job tasks. Once several families are developed, many flexible groupings will be possible--such as the commonalities in the auto body and sheet metal clusters.

Q. Where does the program for teaching related academic subjects (reading, math, science, etc.) fit into such plans?

A. Methodology used in dealing with the vocational curriculum is also applicable to academic curriculum as it is used as a component of vocational education. Some academic curriculum materials have already been accumulated in this manner. However, this is a significant and expensive undertaking. Until development is more advanced, a thorough search should be made for materials proven successful in upgrading student abilities in the various academic areas and appropriate guidelines to their use should be devised. Clearly stated instructional objectives must be available for a number of job family areas before relevant academic program development can be realized.

Q. Is it envisioned that such projects include a guidance program (career decision making, student assessment, prescribing individual learner needs, etc.)?

A. Available guidance programs are inadequate and appropriate systems need to be developed, but the effort involved is significant. Again, some work in such areas has been completed. The best available resources should be utilized.

Q. What about evaluation of ABLE-type programs?

A. As learning units are tried out, they are modified wherever it is found that students cannot understand the objectives, follow the instructions, or pass the performance requirements. The development of a unit is marked "completed" only after evidence indicates that it really works. Evaluation is also based on several measures of student involvement. Evaluation, in general, takes place on several levels. There is a system of revision based on validation against employees on the job. Another is based on how students perform in an ongoing training program. Thirdly, there will be a post-graduation revision based on how students perform on the job.

TECHNICAL DEVELOPMENT

A number of technical reports on ABLE are available through the Educational Resources Information Center (ERIC). Such documents can also be acquired through the American Institutes for Research, 135 North Bellefield Avenue, Pittsburgh, Pennsylvania 15213, or the Quincy Public Schools at cost of printing. One major document of nearly 300 pages, the "Management and Evaluation Plan for Instructional Systems Development for Vocational-Technical Education," was recently released as the Fifteenth Technical Report. A brief review of the goals and objectives of the project is included in the report. A review of the literature is provided for the purpose of defining and clarifying the rationale for the plan. Major emphasis in the manual is given to formative evaluative procedures drawing on student performance data as the primary source of corrective feedback. The system is designed around an iterative process with the major goal of continuous program and product improvement. It is felt that such an approach would provide a regenerative element with self-renewal and updating taking place as a result of the evaluation, validation, and follow-up activities. It is shown how test/revise/retest cycles can and should be perpetuated for as long as the program is in operation. Figure 4, the "Flow Chart of Instructional System Development Process," illustrates the general approach.

The primary evaluation instruments for ABLE have been derived from job and task descriptions and the subsequent specification of behaviorally stated performance objectives. This entails a detailed breakdown of the task activities and an identification of the "critical incidents" which are then translated into criterion checklist instruments. Criterion instruments, called "performance evaluation modules," are also developed from the task descriptions for the purpose of structuring replicable and reliable assessment situations. The performance evaluation modules are further refined to permit effective class management. While such instruments incorporate objective paper-pencil items on related knowledge, the emphasis is on the more important

PROJECT ABLE

FLOW CHART OF INSTRUCTIONAL SYSTEM DEVELOPMENT PROCESS

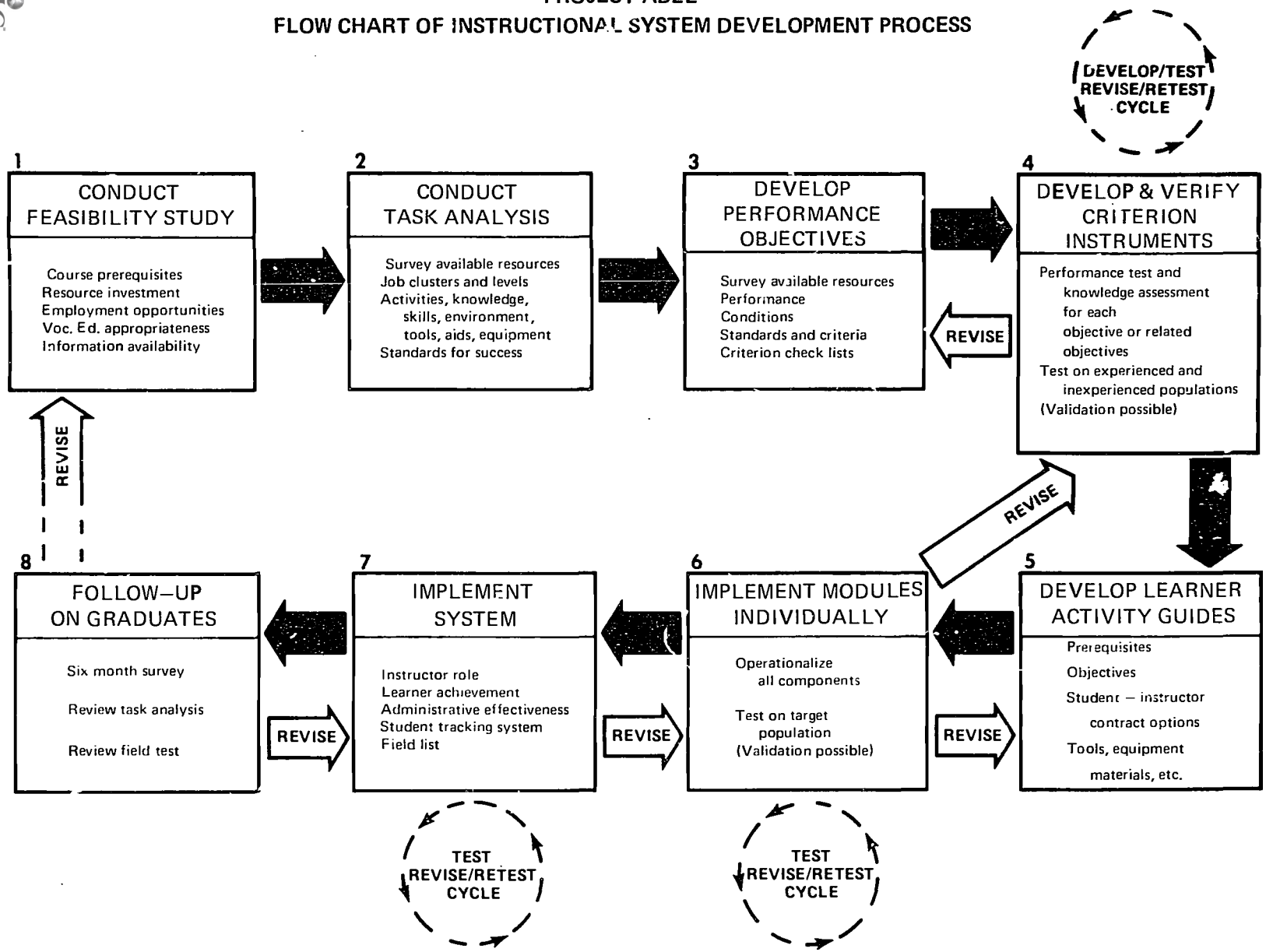

Figure 6.

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"hands-on" or practical performance skill test activities. Self-scoring response and feedback techniques with numerous simulators, mock-ups, samples, and other aids are emphasized in recognition of the critical role such devices play in a functional instructional system.

The entire developmental effort has been characterized by a systems approach centered around successive tryouts and systematic testing. Procedures for the design and application of developmental and evaluative instruments have been developed in considerable detail. Sample materials are included in the above-mentioned Fifteenth Technical Report, along with flow charts, worksheets, and various systems control documents. Management procedures are defined and the entire process carefully documented. A plan for summative evaluation is outlined and guidelines suggested for appropriate application. Sample instruments for both formative and summative evaluation are included.

Completion of the Fifteenth Technical Report resulted in the accomplishment of several major project goals including a part of those reporting obligations usually associated with the final report. The major goals were as follows (see Project Abstract):

1. Demonstrate, as the principal goal, increased effectiveness of instruction whose content is explicitly derived from analysis of desired behavior after graduation.
2. Apply newly developed educational technology to the design, conduct, and evaluation of vocational education.
3. Use newly developed methods of defining educational objectives that derive topical content for courses.
4. Prepare students in the prerequisite knowledges and attitudes needed in vocational education.
5. Individualize instruction.
6. Measure student achievement.
7. Establish a system for evaluating the program results in terms of outcomes following graduation.

The Fifteenth Technical Report dealt primarily with those goals numbered 2, 3, 5, 6, and 7 above. The Fifteenth Technical

Report also reported on development and progress related to goals numbered 1 and 4 above. Of course, the Twelfth Technical Report on the "Power Mechanics Curriculum" and the Sixteenth Technical Report on the "General Woodworking Core Curriculum," provided recent documentation of the application of the developmental and evaluative techniques along with descriptions and data on the implementation and operation of such programs. Other technical reports providing documentation on project progress and objective accomplishment are included as attachments.

Technical report summaries are provided in Appendix A. The review and critique reports (prepared by two consultants) of the Project ABLE management and evaluation plan are included in Appendix B. Correspondence and documents related to the field testing of ABLE curriculum materials among several Great City and ES'70 network schools (Power Mechanics initiated during the 1969-70 school year and General Woodworking scheduled for the 1970-71 school year) are provided in Appendix D. Documents related to the continuation of Project ABLE as a local effort for the 1970-71 school year, following completion of the USOE contract, are included in Appendix C. In short, the pilot instructional systems have been and will continue to be in operation after completion of the USOE contract. Furthermore, the school systems testing the ABLE instructional systems have adopted the procedures, the management and evaluation plan, and the process for continued development. More important, the project is being considered for implementation on a massive scale by a consortium of the twenty-one largest school systems in the country (see attachments numbered 26, 28, 29 and 30).

The technology applied on a limited scale with considerable success by Project ABLE is said to be of national significance. For example, Dr. Robert M. Gagné (presently president of AERA) found the rationale, training materials and testing procedures of remarkable and unusual excellence. He stated, "I should think the acceptance of this method by teachers and students would be well-nigh universal." Dr. William T. Kelly, Director of Vocational Education in Philadelphia, wrote that, "It is imperative

that some method be found to reproduce this material at a cost within the reach of school districts." Dr. Karl F. Dutt, Research Coordinator for the Eastern Northampton County Schools in Pennsylvania, considered the approach to be an "ideal learning experience." Dr. John M. Recklitis, Director of Vocational Education for the Penn Hills School District in Pittsburgh, found one ABLE program to be, "second to none in the nation." Dr. William L. Hull, Research Specialist at the Ohio State Center for Research and Leadership Development in Vocational and Technical Education, stated, "This project (ABLE) may be one of the few in the nation which provides a living example of an innovative diffusion system in action at the local level." Similar reactions from publishers have stimulated plans for national dissemination of several programs. Attachment 30 includes a number of response letters from field experts who have reviewed ABLE technical reports and curriculum materials.

PROBLEMS OF RESEARCH, DEVELOPMENT, AND PROJECT OPERATION

The original goals of the Project called for: (1) curriculum development in 11 vocational families (which probably break out into some 25 to 30 subgroups) at 5 grade levels--Grades 10 through 14; (2) curriculum development in 4 academic areas at 3 grade levels for a projected vocational school enrollment of over 1,000 students; (3) a program of "prerequisite instruction" for the junior high schools; and (4) a junior high guidance program for nearly 4,000 students in grades 7, 8 and 9. A behavioral analysis was to be done for each curriculum area, including a job description and task analysis for the vocational programs. Derivation of behaviorally stated objectives in topical form was to have been a major activity. Furthermore, the project was to develop and implement programs of individualized instruction, and then demonstrate increased effectiveness of such methods and instruction. All areas were to be demonstration programs. In addition, commitment was made to develop an evaluation program for vocational schools which included not only end-of-year examinations, but also the continuing follow-up of outcomes after graduation. The development of performance measures tied to the objectives of instruction were also a part of the project tasks. One other proposed activity was to develop teacher-training materials and conduct an inservice training program which would prepare Quincy staff to do all the things described above. Such objectives and tasks were to be accomplished with some $600,000 in Federal funds and a sizable Quincy contribution over a period of four years (the fifth year was scheduled for program and project evaluation).

After much experience over a period of several years, the project staff developed the capability to project manhour costs (see examples in the Fifteenth Technical Report) for instructional systems development of the type envisioned for ABLE. Subsequent computations have indicated the cost of project completion and total objective accomplishment at between 23 and 25 million dollars. The capability to make such projections simply did not exist at

the time of the planning of the project. However, the positive outcomes should not be overlooked, for the experience gained by ABLE with the documentation provided in the technical reports should be of great value to curriculum developers and sponsors in the field of vocational-technical education. Upon analysis of the cost figures for several of the academic courses in the "modern" mathematics, science, physics, biology, and other such areas supported over the past several years by the Federal government, the estimates for sophisticated development of curricula in vocational education would appear quite conservative.

Funding problems affected Project ABLE in a number of ways. For example, the initiators of ABLE stated in their proposal, that additional support would be necessary at the appropriate time in the project work schedule for both the acquisition and new development of multi-media instructional materials. Such a proposal was prepared but never submitted. Congressional appropriations of research funds for vocational education, during the periods of ABLE operation when such development should have taken place, simply never reached a level which would have permitted the degree of expanded activity required to support an undertaking of multi-media development for the Quincy program.

Funding presented additional problems during the final contract year for the period of October 1, 1969 to September 30, 1970. A Review Panel of eminent educators, in a project evaluation report sponsored by USOE, recommended funding for the final year "...be increased beyond the scheduled amount of $50,000 to an amount not to exceed $150,000, in order to provide for a proper closing-out of the project." However, during the period of continuation proposal preparation (with the recommendations on evaluation and funding by the Review Panel being incorporated), the Congress prolonged for several months the passing of the education appropriations bill. The subsequent Presidential veto, the lowered appropriations for research, and the reduced funding for ABLE adversely affected plans for final year activity. The project staff was instructed by the Policy Board to prepare for early

termination with the completion of school, June, 1970, and to focus on completion of reports and instructional materials already in process. Plans for the establishment of experimental control groups in all curriculum areas for the purpose of comparing ABLE and non-ABLE students were cancelled. (Note, however, that field testing agreements in Appendixes C and D were accomplished with several other school systems for the 1970-71 school year. See also the evaluation sections in the Twelfth and Sixteenth Technical Reports on the Power Mechanics and General Woodworking programs.) On the other hand, an improved funding situation during the summer of 1970 permitted continuation through September 30, 1970 with schedule of work modifications resulting in several significant outcomes.

The opening of the new Quincy Vocational-Technical School building, coupled with expanded offerings and simultaneous introduction of an experimental program presented insurmountable problems. The superimposition of the two innovative activities multiplied the problems inherent to both. Job and task analysis, behavioral objectives and curriculum development of the type proposed for Project ABLE were relatively new for public education. Consequently, a great variety of problems previously unanticipated placed the project on a very slow pace. Important also is the fact that the original plans called for the development of learning units which were to be supported by appropriate commercially available texts and references. It was expected that such available resource materials would fit the needs of topic objectives and, therefore, little development of new materials was anticipated. Such was not the case. Most published material does not lend itself to the topic objectives derived from a truly behavioral analysis. Performance evaluation materials were nonexistent. Funding, however, was not adequate for development of such materials in all areas. Available research monies were spread inadequately over too many curriculum areas at a time when expectation in quality standards for prepared materials and quality standards in evaluation procedures were high. Fortunately, with the cooperation of the USOE, the scope and size of commitments were reduced during the latter stages of operation. The inability

to achieve the original project goals, however, should not diminish the significant contributions Project ABLE has made in the areas of: the technology of instructional systems development; management and evaluation of instructional systems development; individualized and learner-centered vocational education programs and procedures; demonstration programs in Quincy and other cities; quality instructional and reference materials in several curriculum areas; teacher-training programs and procedures; and others.

The analysis, in itself, of problem areas can be an important outcome or product of innovative experimentation. The Project ABLE staff has extensively documented such an experience in the Eighth Quarterly Technical Report, AIR: March 1968. The report describes the problems encountered while designing, developing, and implementing an experimental curriculum. For example, the extent to which the teaching staff was willing to participate in a change was identified as a major area of concern and reinforced the notion that a firm conviction to the new goals and methods ought to precede any new program of instruction. Furthermore, the preparation of instructors to operate effectively under the new learning conditions was found to be of utmost importance to an administration attempting to implement new programs. Not only were the instructors expected to teach in a new situation, but many were assigned to teams for the writing and research effort required to design new programs. However, the teacher-training program, being of utmost importance during the initial early stages, was considered inadequate. Too little time, too many people involved, no operating programs for "live" training, lack of structure and direction, and other factors contributed to the early problems. (A following section describes the teacher-training program used once pilot programs were operational and well established.)

Transforming teachers into writers and curriculum developers was not generally successful, although there have been some notable exceptions. In addition, writers were assigned to the project on a part-time basis, which, in itself, created an awkward

situation. (The continuation project being sponsored by Quincy for the 1970-71 school year will have most of the Quincy personnel assigned on a full-time basis.) Most teachers had difficulty in working with and preparing behavioral objectives. The derivation of proficiency measures and instruments seemed most difficult. Organizing skills and knowledges by job hierarchies and levels presented many problems--most developers tended to follow traditional textbook style and content sequences.

Staff turnover and personnel changes for both Quincy and AIR seriously affected their ability to meet early contractual obligations and stated goals (not to mention the myriad of other problems which were, in themselves, major hurdles). Frequent changes in key administrative personnel were most disruptive. Conditions typified by a highly mobile research community were additional factors in staffing and personnel relationships. The problems of staffing were of special concern to the USOE-sponsored Review Panel. Their report stated:

> Although the basic structure of Project ABLE is exciting, and probably sound, reaching the goals of the project has included many difficulties. Much of the problem appears to be related to numerous personnel changes, both AIR and Quincy staff, and each such change has tended to impede the progress of Project ABLE. Evidently this problem has been understood and the AIR resident staff has attempted to pick up lost ground by a closer operational relationship with a more permanent Quincy staff.

During the final two years of operations, staff stability at the Quincy site was achieved with highly positive results.

Again, the analysis, in itself, of problem areas can be an important outcome or product of innovative experimentation. Future adoption of the Project ABLE concept by other schools will not be easy, but the experience and documentation of Project ABLE will make it possible to avoid many problems and to anticipate others so that advance preparations may be made for their solution.

It can be expected that the establishment of a basis for assigning priorities in a complex school system will be a major problem, as it was in Quincy. In the preliminary tryout phase of future studies all individuals and classrooms may not be

involved. As the "new" is being introduced gradually over a period of years, the problems normally associated with maintaining an efficient operating school system may be compounded. Even with intensive and comprehensive orientation to the new procedures and products, the day-to-day problems which administration, faculty, and students must face and solve still remain. Thus, the establishment of priorities becomes a critical activity. Additional human resources and funds do not always provide the solution. It is difficult to foresee all contingencies.

The organization of a school system to accomodate different learning situations was also discussed in the Eighth Quarterly Technical Report. For example, a number of problems arise when a new curriculum does not entirely replace the old one. The school, then, has the problem of administering two entirely different approaches or systems of learning. The difficulty is further compounded when the two curricula are not compatible in terms of scheduling, learning materials, and teacher preparation. Furthermore, when a new curriculum which has little rigid control over student time and location is introduced, students and instructors often have some difficulty adjusting to it. Different responsibilities for learning are placed on the student and on the instructors.

The availability of materials to support learning experiences poses another challenge. Shortages of materials, learning aids, and other educational support seem to be an inherent problem in all educational systems. In a school system which introduces a new curriculum, the problem becomes more acute because the new situation requires more and different support (usually more expensive) than the old. The problem is increased when individualized materials are adopted by the system. First, the amount of materials is so great in number and bulk that it creates storage and distribution problems. Second, since the materials differ substantially from those used in previous years, both the instructors and students must be trained in their application and use, and the expectations of demonstration programs create anxieties among staff which makes "less than the best" a difficult standard to accept. The budget is never adequate.

There is a definite need to plan every detail and anticipate every contingency when introducing new learning materials into an educational system. Better use of systems analysis and program evaluation and review techniques (PERT) is essential. Preparation of instructors in the administration of these materials and keeping records of student performance and characteristics of materials is needed. Even with unlimited resources and complete flexibility within a school system regarding faculty, students, and the scheduling of classes, the problems of curriculum implementation would still exist. In most cases, a school must adopt new techniques within an existing structure that imposes restrictions and constraints. The introduction of new approaches often demands considerable rearrangement and reorganization of staff, students, and physical facilities. Much time and effort will be required to overcome the early operational problems. For example, the Fifteenth Technical Report on the "Management and Evaluation Plan for Instructional Systems Development in Vocational-Technical Education" was evolved only after pilot programs were well developed and tested. The use of pilot programs for staff training, management planning, and systems development prior to large undertakings has much merit.

It was clearly the intent of the initiators of Project ABLE to forge a new bond of cooperative working relationships in the development and implementation of innovative programs for vocational education. Fortunately, the early recognition of problem areas and the restructuring of project activities have produced encouraging progress and some notable accomplishments. The experience gained in a new and novel undertaking with the detail given to documentation should prove to be of much value in the coming years for the curriculum developers of vocational and technical education.

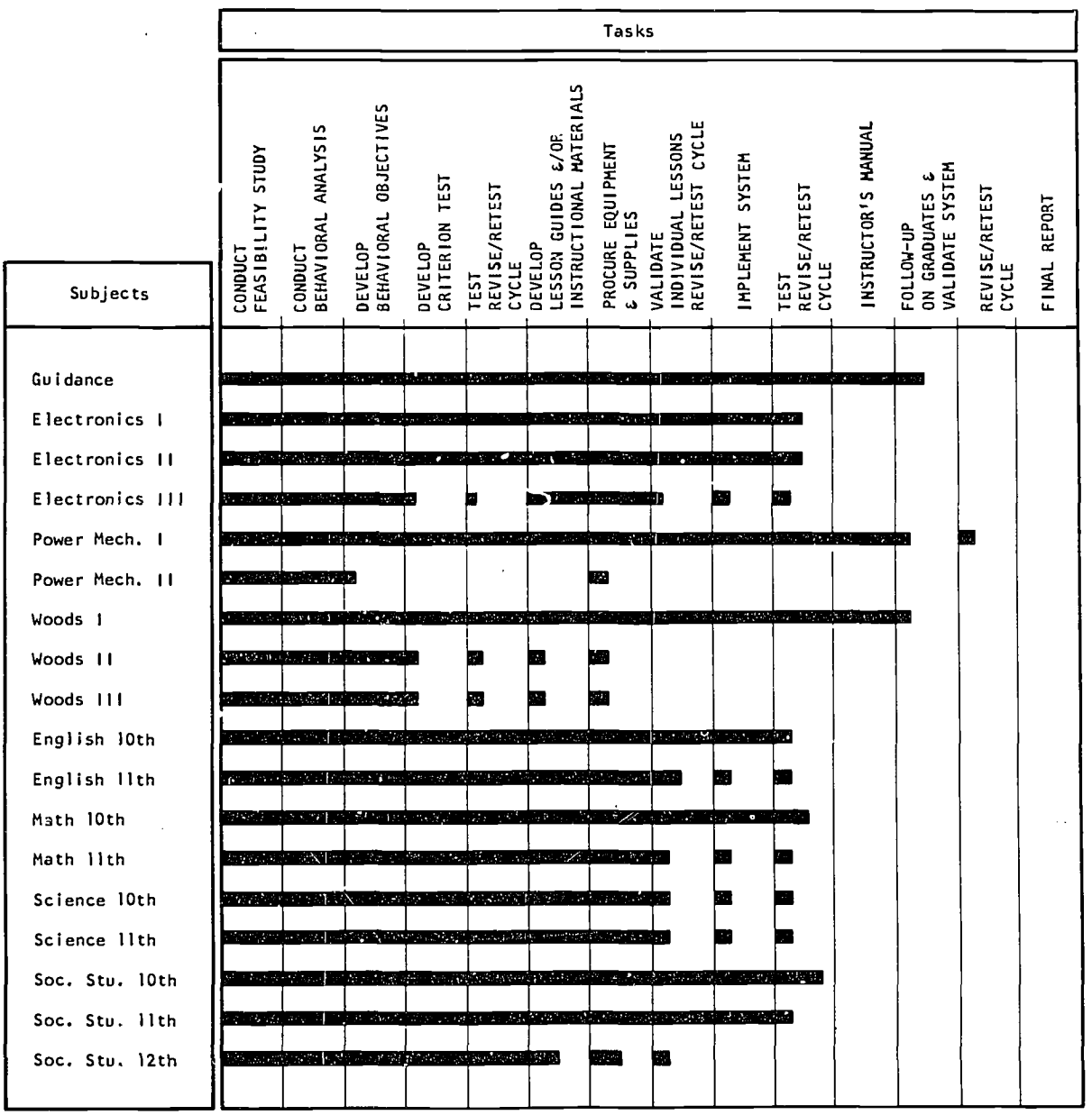
PROGRESS BY CURRICULUM AREA

As the developmental problems became evident in this new and ambitious undertaking, steps were taken, with the cooperation of USOE, to scale down the size of the commitment. Over a period of two years, pilot programs emerged through attempts to place problem solving and development on a more manageable basis. As a result, a number of curricula were prepared and implemented. Two have been completed and others are now nearing completion. Over 6,600 pages of curriculum materials and 1,000 pages of reference materials have been developed for testing with Quincy students (see Forty-eighth Monthly Progress Letter).

Figure 5 depicts the stage of progress for each of the areas under intensive development. Since there are no graduates as yet, follow-up is a plan of the future. Of course, the instruments and procedures for evaluation and follow-up were provided in the Fifteenth Technical Report. The continuation activities being sponsored by Quincy and the field testing of programs now underway should result in continuation of the evaluative and developmental cycles. Note also that time by phase or stage of development is not identified in the Progress Chart. This is because man-hours and time-lines by phase and area are subject to many variables. For example, quality of development is not uniform among the various programs. Therefore, the effort required during the test/revise/retest cycles will vary in relation to the problems of implementation and revision (in addition to other factors which must be taken into account). Unfortunately, several of the curriculum areas may never advance beyond the test/revise/retest cycle presently shown. In such areas, dissemination and field testing would not be appropriate.

Note that developmental progress in seven of the eleven major job family areas is not shown. Most such areas were implemented and tested during the early months following the opening of the vocational school. However, funds were not available to properly initiate the test/revise/retest cycles nor to support

PROJECT ABLE PROGRESS CHART *



* September 1970

Figure 5.

personnel for extended released-time development in such areas. Furthermore, the management of the research activities and the supervision of developmental and evaluative functions could not be made available. (Thus the cutbacks to selected pilot areas.) While many of the products and materials continue to be used in Quincy, dissemination should definitely not be attempted. For such areas, much work is yet required at the stages of "Conduct Behavioral Analysis" and "Develop Behavioral Objectives." It is significant to note, however, that many of the shop teachers throughout the school have made extensive use of the materials developed during the early stages of the project. It is also significant that the school system has elected to continue the development during the 1970-71 school year with an increased local effort.

Guidance

Two major products were prepared as a result of the research efforts in the Guidance area--the Occupational Analyses and the Student Vocational Plans. Occupational Analyses for each of the eleven job families, and one for the professions, were prepared. As reference materials for student use, such documents provided a description of the characteristics and requirements of occupations which were included within each job family. Each analysis includes a brief description of the occupation and some of the tasks involved: Listings of related and lower level jobs, where applicable, and placement opportunities; indications of the expected employment outlook, hours worked per week, and average earnings; information concerning the high school course of study, educational and training requirements, work conditions and physical demands of the job; relation to data, people, and things; personal interests, aptitudes, and temperament compatible with the occupation. The analyses for each family are arranged according to occupational areas.

The second major product is the Student Vocational Plans for grades seven, eight, and nine. (Each booklet is about 50 pages in length.) A primary objective of the vocational guidance plan is to have students participate in activities which require self-

evaluation, investigation of the world of work, and matching credentials with available educational and vocational opportunities. For each of the three major areas, a number of activities were delineated for each grade. Materials were also prepared for grades 10, 11 and 12 with completion of development curtailed through deferment to other priorities. Two major reports, the Fourth Quarterly Technical Report and the Ninth Quarterly Technical Report, describe in great detail the research and development in the guidance areas and include sample materials.

The junior high program was implemented with over 4,000 Quincy students in grades 7, 8 and 9 during the 1968-69 and 1969-70 school years. The effort was seen as a limited objective program with the focus on career decision making. The full scale testing program revealed one major problem identified but not adequately corrected during pilot testing. The reading level for the student vocational plan kits was too high (7.5 for grade seven, 8.7 for grade eight and 11.2 for grade nine). This is most critical since research in the area of guidance has shown that the reading level of student materials has a significant effect on proper use and success of a program. The problem with the ABLE student kit materials was reported in several progress letters to the USOE project contract officer. On the other hand, the set of twelve Occupational Analyses reference manuals appear quite valuable with continued use being assured by the Quincy guidance counselors.

Funds for support of staff for the proper revision of student kit materials have not been readily available. Because several publishers had expressed interest in the reference materials (Occupational Analyses set), a request for proposals was circulated by ABLE offering the entire package for limited copyright under the commercial dissemination plan provided by the Federal government. However, to gain access to the entire package, a publisher would have had to finance the revisions required in the student kit materials. Generally speaking, respondents found the materials to be quite acceptable and of high quality while expressing dismay at the level of investment required for completion of development and

field testing. Thus, the RFP was recently withdrawn. Quincy may wish to reissue the RFP for the reference material while deleting the student kit materials and the requirement for financial support of final revisions.

The situation for the guidance program is unfortunate since the entire effort is so close to fulfillment. Furthermore, the program received a very favorable evaluation from the USOE sponsored Review Panel and has caught the interest of many field experts and visitors to the demonstration programs. However, it is recommended that the student kit materials not be reprinted (costs of which would exceed $2,000 each year for Quincy's 4,000 junior high students or about 50¢ per child) until appropriate revisions and modifications can be accomplished. Quincy and AIR may wish to seek additional support from USOE or other sources for the completion of the development in the guidance area.

A modified version of the ABLE guidance program was implemented and tested successfully, according to interim progress reports, at the Clinton, Iowa Job Corps Center. Termination and cutback of Job Corps programs evidently affected the Iowa Center. Programs at the Center were curtailed early and the researchers were not able to conduct and prepare a final evaluation on the guidance activity. At the time of preparation of this final report, a special report was being prepared on an experimental-control group test of the ABLE program with Quincy students. However, given the reading and implementation problems described, the findings should be only of limited value.

Vocational Areas

Electronics. The Eleventh Quarterly Technical Report, released in January of 1969, dealt with the Electronics Curriculum. A detailed description of the program was presented at that time. Since then, the electronics group has completed the first phase of development for the third level occupations in two areas. Thus, advanced study is now offered in Radio-TV repairman occupations. Furthermore, students qualified for the more difficult tasks may elect a third level technician program which covers a broad spectrum of jobs at a rather high level in the job family hierarchy.

The ABLE program now services all students in the electronics department. Class size averages between 12 and 18 students. Four classes are serviced at the 10th grade, two at the 11th grade and two at the 12th grade. The grade levels are roughly equivalent to job levels. However, students completing the basic tasks at a particular job level in a continuous progress program are permitted to advance immediately to the next training level.

The first two job levels have been through two complete test/revise/retest cycles. "Learner Activity Guides and Performance Evaluation Sets" and ABLE developed programmed instructional materials are available at both levels. Instructional materials at the second level include adaptations of the Lowry Air Force Electronics Mechanics package. The two third level programs have both Learner Activity Guides and Performance Evaluations available. However, Performance Evaluation testing and revision has not been completed. Nevertheless, the programs are operational and function as individualized instructional programs. Over 1,500 pages of instructional materials have been prepared for the four job training areas.

The major activity in the electronics areas during the 1969-70 school year centered around the development required to operationalize the two third-level programs. No summer (1970) development was scheduled. Also accomplished during the 1969-70 school year were extensive modifications of the Learner Activity Guides at the three levels. The heavy emphasis on new development, expansion and operationalization of programs precluded the proper application of the management and evaluation procedures such as prescribed in the Fifteenth Technical Report. Manhours in released class time were not adequate to undertake the detailed observation, data collection, and analysis required for proper test/revise/retest cycling and program evaluation. Furthermore, Federal funds were not adequate during the final contract year to provide for additional research staff personnel as recommended by the Review Panel for evaluation activity (see budget discussion in Problems section). Quincy did, however, as a local effort, provide one teacher at each job level with a schedule of half-

time teaching and half-time development. Thus, while much development took place with two additional areas being placed into operation, evaluation was inadequate. Hopefully, the Quincy supported continuation for the coming 1970-71 school year will permit the proper application of the test/revise/retest process which was developed as a part of its ABLE project. Until such rigorous procedures have been applied, field testing should not be undertaken and dissemination should be guarded against. At the time of the completion of the five-year USOE-supported effort, only two of the three pilot areas (Power Mechanics and General Woodworking) in the vocational program have been validated locally according to the plan. Both such areas are ready for field testing. Field testing was undertaken during the spring of 1970 for Power Mechanics. General Woodworking will be ready for field testing during the fall of 1970.

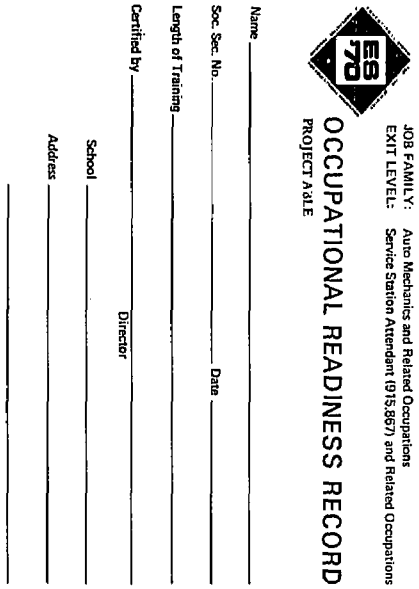
Power Mechanics. The Twelfth Quarterly Technical Report provided extensive documentation on the Power Mechanics curriculum. Included was a description of an end-of-course comparison between the 10th grade ABLE students (completing the first entry level program) and the advanced students enrolled at the 11th grade in a traditional program. The comparisons were made on basic job tasks and knowledge. The ABLE students were superior on job task practice and knowledge and were also better able to use automotive technical reference materials, lubrication guides, and catalogues. However, as with all ABLE programs, the numbers of students involved are small. Thus, the field testing activities take on added importance (see Appendix D). The management and evaluation procedures were developed and tested in pilot programs (such as Power Mechanics) as was the teacher training program.

As a part of the process of development, new grading and student assessment methods were applied. The specification of behavioral or observable performance objectives enabled important deviations from traditional grading and student evaluation procedures. A sample progress and certification reporting card or record is included in Figure 6. With such functional reporting methods (a condensation of information from the Criterion Check-

list--Appendix E) little practical value would be gained by a continuation of traditional letter grades (i.e. A, B, C, D, F). Note that the reporting method does allow for an exercise of the instructor's expert judgment, task-by-task, through the L-M-S ranking. Note also that failures are not recordable. The student is certified on only those tasks in which a minimum level of competency can be demonstrated. In a sense, there are no failures. Some students will simply take longer than others to reach the various criterion levels task-by-task and job-by-job within the occupational hierarchy.

Student Tracking Device. The progress board shown in Figure 7, as an information feedback mechanism, can provide the type of guidance presently included in many of the available computer support programs. This is a low-cost student-operated mechanical system which will offer interim relief to the inordinately high costs of present day computer systems. Furthermore, the information is available at a glance at all times. Student location and the job task he is practicing is always identified. As indicated, red tags show location (absent, office, nurse, etc.) or task being performed by each student. Green tags indicate completion of performance evaluation and task certification. Yellow tags show that instruction has taken place and been completed on any one module or job task. Students applying the performance evaluation as a pre-test in order to certify competency and bypass instructional activity will have only green tags on such tasks. Masking tape under each tag provides a written record should the tags become scrambled. Again, each student maintains his own tracking and progress recording. Of course, the instructor keeps his own grade-book record as Criterion Checklists are completed. A quick glance will reveal work completed, options remaining, and rate of progress.

The approach has had interesting effects on student motivation. The implementation of the tracking system (along with other system modifications) resulted in a nearly 50% increase in student productivity--more work accomplished in a shorter period of time with a marked reduction in recorded discipline cases. The



OCCUPATIONAL READINESS RECORD

TO THE EMPLOYER:

This occupational readiness record is both an inventory of the training course content and level of proficiency or achievement demonstrated by the graduate. Graduates can provide potential employers with more *complete performance check lists which itemize in great detail the* skills and knowledge in which he has demonstrated proficiency. It is recognized that persons working at the specified occupational level will function with direction and assistance from superiors. As a part of his training, the graduate has learned to accept appropriate instructions with each assigned task. Furthermore, the graduate should understand that he lacks the authority and training to perform certain functions and operations. He will expect and seek, supervision, assistance and direction where appropriate. Note that the job tasks as identified, are basic to the next higher or more sophisticated job level. Work experience and further training may qualify the graduate for more complicated tasks, a new job title, and higher pay.

KEY TO PROFICIENCY CODE:

Level L: Limited Skill-does simple parts of task using required tools, but requires instruction and supervision to do most parts of the job. Identifies parts by name, knows simple facts about the job.

Level M: Moderate Skill-requires help on some parts, but can use most tools and special equipment needed. Knows work procedures but may not meet minimum demands for speed or accuracy.

Level S: Skilled-understands operating principles and accomplishes all parts of task with only spot checks of finished work. Meets minimum demands for speed and accuracy.

All graduates receiving this document have satisfactorily demonstrated to the training staff their ability to work safely, understand and carry out instructions, and cooperate with other employees. This document also attests to their punctuality, reliability, and general work habits.

Project ABLE/Quincy Public Schools/American Institutes for Research

JOB FAMILY: Auto Mechanics and Related Occupations

EXIT LEVEL: Service Station Attendant (915.867) and Related Occupations.

Name_____ Date_____

Soc. Sec. No._____ Length of Training_____

Certified by_____ Title_____

Comments_____

LMS	
☐☐☐ Shop Safety	☐☐☐ Services Miniature Bulbs and Sockets
☐☐☐ Fire Safety	☐☐☐ Removes and Replaces Headlamps
☐☐☐ Basic Mechanic's Handtools	☐☐☐ Identifies Common Spark Plug Deposits
☐☐☐ Automotive Terminology	☐☐☐ Cleans, Gaps and Tests Spark Plugs
☐☐☐ Identifies Customer Needs	☐☐☐ Removes and Replaces Spark Plugs
☐☐☐ Cleans Service Area and Equipment	☐☐☐ Tests and Adjusts Tire Pressure
☐☐☐ Raises Cars With Floor Jacks and Combination Bumper-Frame Jacks	☐☐☐ Removes and Rotates Wheels
☐☐☐ Raises Cars With Twin-Post Hydraulic Lift	☐☐☐ Inspects Tires and Identifies Common Defects and Wear
☐☐☐ Identifies and Replaces Defective Drive Belts	☐☐☐ Mounts and Demounts Tubless and Tube-Type Tires on Tire Machine
☐☐☐ Inspects Vehicle Lighting Circuit	☐☐☐ Repairs Tubeless and Tube-Type Tires

LMS	LMS
☐☐☐ Washes and Polishes Vehicles	☐☐☐ Visually Inspects Cooling System Identifies Common Defects and Leak Points
☐☐☐ Tests Battery With Battery Hydrometer	☐☐☐ Flushes and Fills Cooling Systems
☐☐☐ Inspects Batteries and Performs Minor Repairs	☐☐☐ Tests Thermostats
☐☐☐ Cleans Batteries, Posts and Cables	☐☐☐ Removes and Replaces Thermostats
☐☐☐ Removes and Replaces Batteries	☐☐☐ Lubricates Body—Doors, Hinges, etc.
☐☐☐ Charges Batteries With Fast and Slow Charger	☐☐☐ Identifies Specified Engine Oil, ATF and Lube Grease
☐☐☐ Inspects and Tests Radiator Pressure Caps	☐☐☐ Checks Engine Oil and ATF and Fills to Proper Level
☐☐☐ Pressure Tests Cooling Systems	☐☐☐ Determines Oil Lubrication and Filter Service Requirements
☐☐☐ Tests Antifreeze	☐☐☐ Services Air and Gas Filters
☐☐☐ Identifies Common Hose Defects	☐☐☐ Changes Oil and Oil Filter
☐☐☐ Removes and Replaces Hoses	☐☐☐ Lubricates Chassis

The trainee has had limited experience in dispensing fuel, receiving credit and cash payments, and keeping records and inventory. On-the-job training required in these and other areas.

Figure 6.

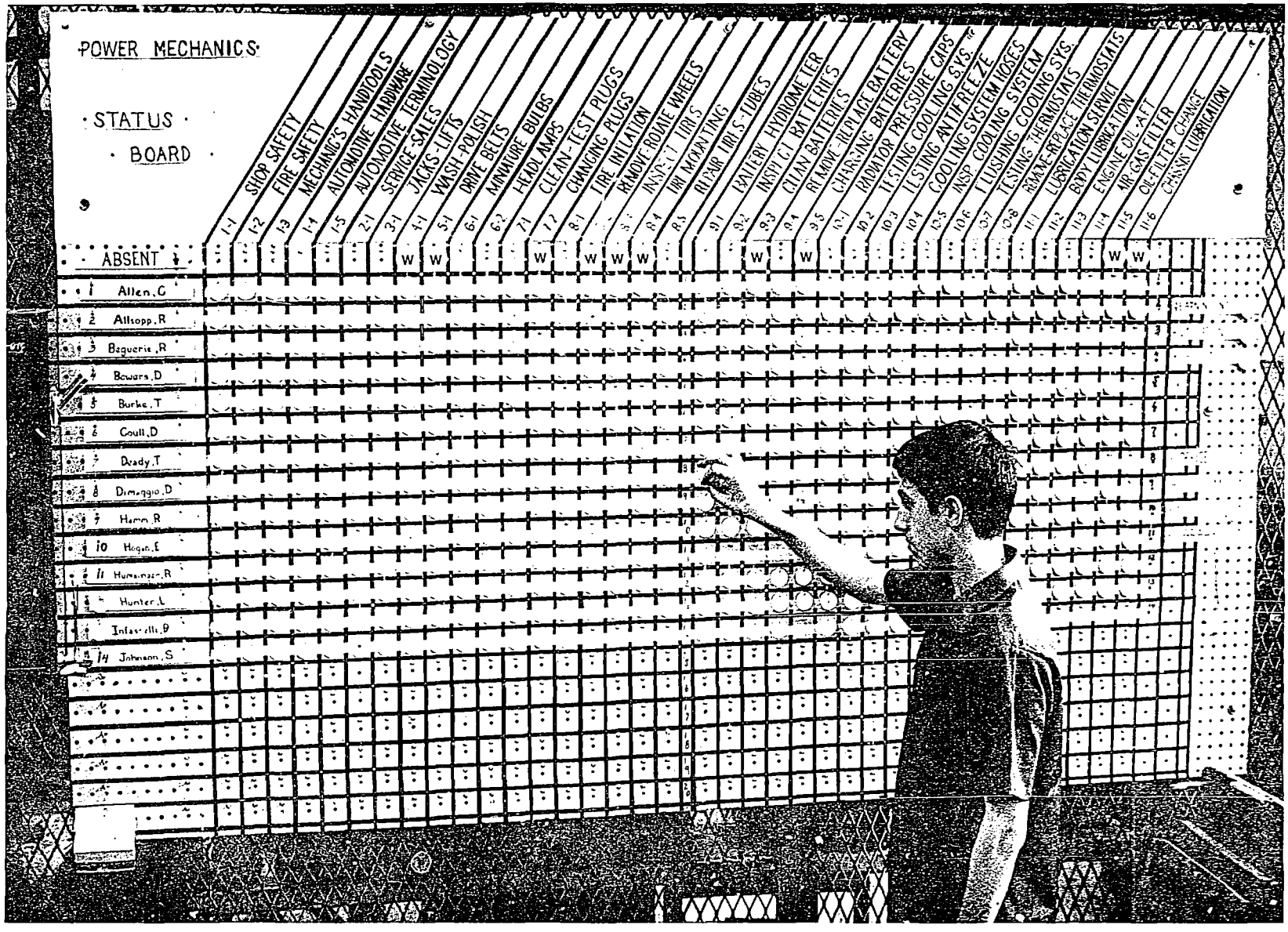

POWER MECHANICS
STATUS
BOARD
ABSENT
1-1 SHOP SAFETY
1-2 FIRE SAFETY
1-3 MECHANIC'S HANDTOOLS
1-4 AUTOMOTIVE HARDWARE
1-5 AUTOMOTIVE TERMINOLOGY
2-1 SERVICE-SALES
3-1 JACKS-LIFTS
4-1 WASH-POLISH
5-1 DRIVE BELTS
6-1 MINIATURE BULBS
6-2 HEADLAMPS
7-1 CLEAN-TEST PLUGS
7-2 CHANGING PLUGS
8-1 TIRE INFLATION
8-2 REMOVE-ROTATE WHEELS
8-3 INSPECT TIRES
8-4 TIRE MOUNTING
8-5 REPAIR TIRES-TUBES
9-1 BATTERY HYDROMETER
9-2 INSPECT BATTERIES
9-3 CLEAN BATTERIES
9-4 REMOVE-REPLACE BATTERIES
9-5 CHARGING BATTERIES
10-1 RADIATOR BATTERY
10-2 TESTING PRESSURE CAPS
10-3 TESTING COOLING SYS.
10-4 TESTING ANTIFREEZE
10-5 COOLING SYS. ANTIFREEZE
10-6 INSP. COOLING SYSTEM HOSES
10-7 FLUSHING COOLING SYSTEM
10-8 TESTING COOLING SYS.
11-1 REMOVE-REPLACE THERMOSTATS
11-2 LUBRICATION SERVICE
11-3 BODY LUBRICATION
11-4 ENGINE OIL-A.F.
11-5 AIR-GAS FILTER
11-6 OIL-FILTER CHANGE
CHASSIS LUBRICATION
Allen, C
Allsopp, R
Baguerie, R
Bowers, D
Burke, T
Coull, D
Drady, T
Dimaggio, D
Hamm, R
Hogan, E
Hunter, L
Johnson, S

Figure 7.

teacher was freed of unnecessary clerical chores which enabled an increase in tutorial interactions with individual students. Teacher anxiety was reduced with the better managed instructional environment. Graduation into the next higher job level became a visible fact and an accomplishable goal. Such a graphic presentation of individual progress in a flexible program of learner-centered instruction has had a marked effect on students, teachers and visitors.

A sample module is included in Appendix E. The basic module includes the Learner Activity Guide and Performance Evaluation Set. The recently completed Fifteenth Technical Report provides a detailed description of such instruments along with methods of development, evaluation and use. Included in that report are related sections on learner activity devices, job and task analysis, criterion referenced assessment instruments, criterion test construction and validation, student self-scoring response and feedback devices. Also included is a general rationale for proper use of the guides and evaluation materials in a program of individualized instruction incorporating systems techniques in curriculum development and operations. Because of the detail of discussion required for a review of such topics and the intended use of the Fifteenth Technical Report as a supporting document to the Final Report, further elaboration is not needed as part of this report. Sample programmed instruction modules such as that specified as one of the student-instructor contract options in the Learner Activity Guide (Appendix E), are included as a part of the Twelfth Quarterly Technical Report on the Power Mechanics Curriculum along with a discussion on development and validation.

As a part of the implementation and testing conducted during the 1969-70 school year, an item analysis (appropriate to criterion referenced tests) was undertaken. The results indicated the need for minor revisions throughout the set of first level materials. Such revisions were accomplished during the summer of 1970 along with various changes in format. Materials being provided for field testing during the 1970-71 school year will in-

clude all necessary revisions. The cycling of the first level program should be considered complete with no further modifications warranted on the basis of limited testing in Quincy. However, the expanded field test should provide reasonably valid and reliable information for appropriate system and material modifications prior to general dissemination.

General Woodworking. The Sixteenth Technical Report, released in July, 1970, reviewed the development and evaluation of the General Woodworking Core Curriculum. Included was a discussion on the rationale, methodology for selection of training programs, management and evaluation, target population, course organization and strategy and initial testing and validation. As with the Power Mechanics curriculum, learner activity devices, the Occupational Readiness Record and a student tracking system were described in the report. Other important documents included were: A frequency chart of job skills, a chart of developmental activity by sub-families and the three year general woodworking program chart. The attachments included the job title enumeration, the general woodworking occupational analyses, all performance objectives by job family clusters, the performance objectives for the basic woodworking core program, a sample Learner Activity Guide and Performance Evaluation Set, a list of times required to complete learning and performance assessment activities, and recommended tools, supplies, equipment, and training aids. The report is also intended to serve as an instructor's manual for the field testing activities scheduled for the 1970-71 school year. The report was prepared as a companion document to the Fifteenth Technical Report, since extensive direction will be required in the management and evaluation of the program activities and field testing.

A comparison of ABLE "woods" students for the 1969-70 school year to those students enrolled at the same level during the previous year, found the number of job tasks and behavioral objectives accomplished more than double that of the previous year. Furthermore, discipline problems handled and recorded dropped from 35 to 5. Other interesting comparisons were noted, such as

the advance registration figures for the 1970-71 school year which indicate an 85% increase in enrollment in the ABLE basic woods course. This compares to an overall rate of increase in enrollment of 45% for the vocational school across all job family areas.

Academic Areas

Major features of each of the ABLE academic classrooms, in addition to the methods of individualized instruction, are the "decentralized resource centers." In an attempt to increase student motivation, improve program effectiveness and relevancy, and bring about a closer relationship between the academic program and the vocational areas, numerous resource materials and alternative texts (alternative to the highly structured core type materials developed by ABLE) have been placed in the classrooms. The obvious emphasis here is on flexibility and accessibility to many materials appropriate to vocational related studies.

To further improve on the critical integration of vocational and academic studies, the academic teachers had been given release time to visit shops, develop their resource areas, and to improve their instructional materials. Furthermore, Quincy is attempting to acquire the capability to prescribe for each individual, his learning requirements and activity. Computer capability through Project PLAN, the availability of behavioral objectives for the vocational and academic areas, and the accumulated data on each student from the time he enters school may well spell "breakthrough" in what now is described as a major concern--the effective and appropriate integration of academic and vocational studies. Generally speaking, however, Project ABLE was not successful in this area. The flow chart provided in Figure 2 has important implications in this critical area of national concern--the effective integration of vocational and academic studies. Project ABLE was to have pioneered development in this area. However, recent cost estimates of 23 to 25 million dollars for the accomplishment of the major project goals will provide some indication of the size of the problem. A restructuring of national priorities with adequate financial support will be required to meet such obliga-

tions. In the interim, the completion of critical components, such as indicated in Figure 2, should enable early progress (in limited areas) in the effort to prescribe for the individual student his vocational and academic needs. This capability is directly related to the effective and relevant integration of vocational and academic studies. The ability to prescribe those needs will advance concurrently with our ability to define student, curriculum, and school goals and to evaluate success in achieving stated goals. And progress in this area will, as a natural outgrowth of the new educational technology, lend some meaning to the concept of "accountability for learning results."*

Development and revision of academic materials were turned over to the respective departments within Quincy High School with the opening of the 1969-70 school year and the start of the final Project ABLE contract year. The materials have also been released for use at the discretion of the various departments. Funding, as indicated earlier, was not adequate to undertake extensive evaluation during the final year. Academic personnel were returned to full-time teaching duties as preparations were made to terminate the project. The research coordinator in the academic areas was terminated with the start of the final year.

As indicated in the Fifty-Fifth Monthly Progress Letter to the USOE Contract Officer, selective dissemination of academic materials to a limited number of ES'70 schools was arranged by the Quincy ES'70 Coordinator. For example, Mineola, New York, has had a Title III grant to develop mathematics curricula. Copies of all ABLE math materials and related research reports were given to Mineola. English materials were forwarded to the Mamaroneck, New York, system which has had a Title III grant for English

*Independent educational accomplishment auditors, according to the Phi Delta Kappan, January 1970, are being employed by USOE to implement a learning accountability system as required by law. The goal is to make schools and educators responsible for the learning success and failures of their students. It is also hoped that the new concept will also introduce a type of cost effectiveness into the learning system. It is predicted that the accomplishment auditor will become as vital to schools as the fiscal auditor.

curriculum development. Similar arrangements were made in the Social Studies and Science areas. One result of such efforts will be, according to agreements, the availability to Quincy of all early draft materials suitable for classroom use. Hopefully, such cooperative efforts will work to the mutual advantage of all ES'70 network members.

Plans have been presented and approved to utilize the ABLE materials in various ways with 400 Mathematics students and some 900 English students. (See Appendix C.) Many of the students in the Social Studies and Science departments will be using some form of ABLE materials during the 1970-71 year. The rationale, according to the teachers and department heads, for using such materials (even though the modules have not been through the test/revise/retest cycles with appropriate formative and summative kinds of evaluation) is that more suitable or better alternatives do not seem to be available. (This is with respect to individualized programs for the vocational students.) While such materials may find appropriate use and application in Quincy, the research staff has issued a caution against general dissemination. To reiterate, the materials have been released by ABLE to selected ES'70 systems--specifically those holding research and development grants in the respective areas. However, it is not known at this point whether or not any modifications and testing has taken or will take place. Several publishers have expressed an interest in the academic materials and were furnished with cost estimates for completion of such programs. However, it is doubtful that adequate funding through private sources will be available.

As reported in the Fifty-Eighth Monthly Progress Letter to the USOE Contract Officer, the progress reports prepared by each of the instructor-coordinators in the academic areas for a December 1969 Policy Board Meeting, were similar to one another in many respects. In summary:

1. Reactions from visitors, teachers and students were said to be "very" favorable or "generally" favorable.

2. More teachers should be involved in the program.

3. More resource materials are needed and better use made of existing materials (available within each department).

4. Audio-visual materials and more laboratory activity are needed as an alternative to the printed media.

5. Much work is needed on criterion exams.

6. Twelfth grade materials are not complete (and no funds are available).

7. All materials are in need of several revision-retest cycles (and again, no funds are available).

8. The quality of the first and second draft materials justify the investment required to support the test-revise-retest cycles.

9. The real needs of the vocational students should be better defined.

10. The type of "systems" team effort and procedures to properly undertake such development never occurred. (This would have required several million dollars.)

11. A better integration of the vocational and academic studies is needed.

12. Better ways of integrating the academic students and the vocational students need to be found.

Technical reports have been submitted for each of the academic areas. Several were released just prior to the preparation of the Final Report. The programs are described in considerable detail and sample materials are included. Reference to evaluation and validation will be found to be minimal. Proper cycling of the academic programs was not possible. The procedures called for in the Fifteenth Technical Report are rigorous and not likely to be inexpensive. Furthermore, it is not likely that USOE, field experts, and persons in a position to influence widespread dissemination of such programs would accept less in terms of the rigor of program development and evaluation. Thus, widespread use of ABLE academic materials will likely never occur. Adequate funding for such development is evidently not available. It is, of course, recommended that dissemination not be attempted unless the test-revise-retest cycling has been accomplished.

ACCOMPLISHMENT OF PROJECT OBJECTIVES

Description and Objectives

The initiators of the funded ABLE proposal stated, in the proposal section on DESCRIPTION, that the research effort would emphasize the use of techniques for (1) developing vocational and technical course objectives based upon a behavioral analysis of the requirements of present and future jobs in the job families selected by the Quincy Public Schools; (2) selecting and designing instructional materials for topic objectives within these areas; (3) developing measures of performance to assess student progress; and (4) carrying out an evaluation of the program. The initiators summarized the section by stating:

> In brief, the intent is to bring to bear some of the most promising new ideas in educational technology to the design, development, and tryout of a modern curriculum for the education of high school students who are oriented toward careers in which college bachelor's degrees are not involved. (AIR, November 1964, p. 3)

The initial proposal states the principal goal of the project as being the demonstration of the increased effectiveness of instruction whose content is based upon explicit derivation from analysis of desired behavior after graduation. The subordinate goals which were embodied in the plan were as follows:

> 1. Development of educational objectives. The intent here is to identify the behaviors which are desired of the student when he has completed a particular course of instruction. These objectives will be stated in specific, operational terms. While emphasizing the vocational area of educational goals, they will include the development of individual attitudes toward work, habits of work, and standards of excellence. They will also give due consideration to the goals of self-fulfillment and good citizenship.
>
> 2. Derivation of curriculum requirements. Curriculum needs will be derived by an explicit and rigorous method, described in terms of topics within each "subject," and placed in an instructional sequence which takes prerequisite knowledges systematically into account. Particular attention will be paid to the overcoming of individual deficiencies which may represent the cumulative effects of cultural or educational deprivation.

3. Description of needs for prerequisite learning in junior high years. The elaboration of a new curriculum for the vocational-technical school will also make possible the specification of prerequisite knowledges to be acquired in junior high years of schooling, including the kinds of student preparation which might be gained in industrial arts and other basic areas of instruction. The aim of this description of preparatory instruction will be to make possible the development of broad exploratory programs in the junior high grades by the Quincy schools, to prepare students for productive educational and vocational careers.

4. Effecting changes in student viewpoints toward the new school. The new school, with its newly designed educational offerings, should become attractive to students of a variety of backgrounds and abilities. To insure that 9th grade students will make suitable choices, a special information and guidance program directed to this end will be undertaken. This involves the inservice education of junior high school guidance counselors, and the provision of materials and information for junior high students.

5. Individualizing instruction. A set of procedures will be devised which encourage the student to take responsibility for his own learning, and to pursue specific instructional objectives which he understands and accepts. This outcome in turn leads to the tailoring of instruction, within limits, to meet individual student needs.

6. Student evaluation. Appropriately derived topic objectives will lead directly to measures of student performance. It is desired here that all "units" of instruction have performance measures which are available to the student, to instructors, and to guidance counselors. The student evaluation file should be a clear history of learning achievement.

7. Program evaluation. Student evaluations will yield many of the basic data for program evaluation. A comprehensive program of evaluation will include other objective measures of immediate outcomes, as well as the foundations of techniques for the later collection of follow-up data on educational outcomes after graduation. (AIR, November 1964, pp. 9-10)

The goals of the project as summarized in the Project Abstract can be illustrated as follows:

1. Demonstrate, as the principal goal, increased effectiveness of instruction whose content is explicitly derived from analysis of desired behavior after graduation.

2. Apply newly developed educational technology to the design, conduct, and evaluation of vocational education.

A. Use methods of defining educational objectives that derive topical content for courses.

B. Prepare students in the prerequisite knowledges and attitudes needed in vocational education.

C. Individualize instruction.

D. Measure student achievement.

E. Establish a system for evaluating the program results in terms of outcomes following graduation.

Specific Outcomes

The findings and outcomes of the proposed program were expected to provide a demonstration of "national significance" regarding the improvement of the status and conduct of vocational education. More specifically, the expected outcomes are outlined and summarized as follows:

1. The demonstration of applicability of newly developed educational technology to an important enterprise in vocational education. Included in this technology are methods of defining educational objectives, deriving course content, individualizing instruction, measuring student achievement, and evaluating program results.

2. Demonstration of the feasibility of highly flexible planning of vocational education for the individual student, incorporating goals of vocational competence, including positive attitudes toward work, effective work habits, and standards of performance. In addition, the goals of responsible citizenship and individual self-fulfillment will be incorporated and illustrated by a model providing a concrete description of such a system.

3. Increased amounts of student motivation and achievement, related in unusual ways to background and ability factors.

4. Development and application of techniques of providing instruction which takes full account of individual differences in ability, interest, and prior learning.

5. Development and application of new materials for student guidance in the junior high years, in preparing students to take advantage of the opportunities offered by sound vocational education compatible with their interests and abilities.

6. Demonstration of high amounts of vocational competence and versatility on the part of graduates of vocational and technical courses.

7. Design and establishment of a continuing system for evaluation of vocational education in the Quincy Public Schools in terms of procedures for assessing outcomes following graduation.

8. A set of reports and associated instructional materials which will account for the study and its findings, intended for the widespread dissemination of practical techniques, results, and conclusions. (AIR, November 1964, pp. 11-12)

Procedures

The procedures established for project objective accomplishment are listed below. The progress toward the goals and technical report summaries included in Appendix A, can be used as a brief review to trace the progress in the application of the recommended procedures in project objective accomplishment. The general design was as follows:

1. Behavior analysis (for 11 job families at grade levels 10 through 14, 4 academic areas and the arts grades 10 through 12, a prerequisite program of instruction for the junior high, and the guidance program for grades 7 through 12).

2. Development of course objectives. (With additional consideration for the broader goals of vocational education including responsible citizenship and individual self-fulfillment. Also, broadly applicable and generalizable competencies from the academics and the arts.)

3. Delineation of topic objectives.

4. Guidance and information for junior-high students. (Including inservice training, information dissemination, and preparation of materials.)

5. Selection of instructional materials, methods and aids.

6. Development of required materials. (The availability of much appropriate shelf material was assumed. Additional funding was to be sought for multi-media development.)

7. Development of performance measures.

8. Development of instructional procedures. (A major emphasis on individualized instruction in a learner-centered program. See Figures 2 and 3.)

9. Instruction for Quincy School personnel.

10. Planning and conducting program evaluation.

Quincy, in preparation for Project ABLE and the establishment of the new vocational school, was committed to the following course of action as stated in the proposal submitted to USOE.

> Organizational planning is currently concerned with:
> 1. Achieving an appropriate balance of conceptual to manual skills in technician training.
> 2. Providing adequate opportunity for students to learn related and relatable skills and subject matter without sacrificing vocational learning.
> 3. Individual scheduling.
> 4. Providing a differentiated curriculum on a continuum from practical to theoretical.
> 5. Programming with sufficient flexibility to permit vertical and horizontal transfers.
> 6. Making cooperative arrangements with business and industry that will provide valuable learning experience which cannot be provided in the school. (AIR, 1964, p. 1)

Discussion

Procedures. An evaluation of Quincy's preparation for Project ABLE and organizational planning, as described in the six points above, must take into consideration the fact that ABLE could only service a limited number of areas on a selective basis. Thus, for example, individualized scheduling in a situation where most classes and shops still operate on a traditional basis was not fully accomplished. Furthermore, the ability to operationalize the components described in Figure 2 is not yet possible on a school-wide basis. Programming with sufficient flexibility to permit vertical and horizontal transfers is difficult to accomplish without functional programs of individualized instruction. Therefore, such practice has found limited application outside the ABLE pilot areas. Quincy has had a steady expansion of organized cooperative work-study programs with industry. However, the vocational school has not generally been involved in cooperative programs other than the informal activities which most instructors arrange for after-school work in the various trade areas for many of their

students. In some courses, such as the automotive program, such after-school work in related jobs would include the majority of students enrolled in the trade program. It would appear that Quincy, with above average expenditures per pupil, does a better than average job in the areas identified in points 1, 2, and 4 of the six items under organizational planning.

The procedures established for project objective accomplishment, as the testimonials and reactions from field experts will support, were well designed and applied in several of the ABLE programs. Again, the fact the entire vocational school program (along with junior high guidance, the pre-technology program, and the academic and arts curricula) could not have been fully developed through such procedures should not detract from the important gains achieved within the budgetary limitations.

The procedures related to the development of objectives were also successfully applied in the intensively developed areas. As reported in the Fifty-Seventh Monthly Progress Letter, one of the more important outcomes of Project ABLE is the hundreds of behavioral objectives which have been prepared in the vocational areas. Complete sets have been released to the Research Coordinating Unit (RCU) of Massachusetts and the Instructional Objectives Exchange at the University of California, Los Angeles (UCLA). The objectives are keyed to tasks which in turn are ranked on a hierarchy of job skills and levels. More important, the objectives are generalizable to several hundred occupations which were clustered by job families.

While the early efforts at teacher training were inadequate and a factor in the early problems of the project (see Problems section), the subsequent establishment of operational demonstration programs resulted in a teacher training program of some significance, locally and nationally. As reported in the Fifty-Ninth Monthly Progress Letter, ABLE developed and then conducted during the month of February 1970, an instructor training program. The first trainees were from the Baltimore and Philadelphia school systems. (A number of Quincy personnel have participated on a

more informal basis. The ABLE instructors have had intensive training on a tutorial basis with the research staff.) The purpose of the training was to insure proper implementation, operation and evaluation of field test activities for the power mechanics instructional system. The instructor training program was designed as a "hands-on," individualized, self-paced experience. The trainees (after receiving a brief overview of project programs, techniques, processes, etc.) entered the power mechanics course playing the role of novice students. They were required to successfully perform as students in the accomplishment of learning materials, performance evaluation modules, and operation of the system components. This included use of the research instruments and information forms which the instructor would ultimately administer. Proper operation of the student tracking system and the various training aids were included. Of course, the trainees were evaluated against program criteria by experienced staff.

The instructor-trainees were then placed in the role of course instructors and allowed to practice that job under live conditions. This included the administration of various research instruments intended for validation purposes during the field test activities. The trainees were also evaluated in their activities against the Instructor Performance Checklist (see Fifteenth Technical Report). Here, three levels of certification were again required. (A supervisor from each of the field test schools received the same training.) Additional practice was structured as an inservice program in which the course modules would be operationalized and implemented one at a time at the test site. Precise procedures have been specified which will enable a standardized replicable process to be followed in the implementation and testing of course materials module by module. Supplementary documents and optional reading materials were provided each trainee along with optional "enrichment" resources (theory and philosophy related to individualized instruction, systems development, behavioral sciences, etc.) Such training was accomplished in

less than three days. More important, the same process will be replicable at each of the field test sites when general dissemination is undertaken.

A similar training program is recommended (and has been applied in Quincy) for system development team members. Of course, the next logical step in the progression from instructor to novice developer (systems team member) would be to select simple job tasks from the occupational analysis and repeat the various phases of the developmental process until quality products are available and proper procedures demonstrated. This involves a simple test/revise/retest cycling of all steps until adequate performance is attained. Additional information and recommendations on the systems development team were included in the section on Recommendations in the Fifteenth Technical Report.

Further discussion of the ten items listed under Procedures in this chapter need not be presented here in view of the extensive documentation provided in the Fifteenth Technical Report. The development of the process for effective application and implementation of the procedures specified for ABLE, through the documentation of recent technical reports with the establishment of demonstration and field test programs, may well be the major accomplishment of ABLE as well as a contribution of national importance.

Specific Outcomes. The findings and outcomes of the proposed program were expected to provide a demonstration of "national significance" regarding the improvement of the status and conduct of vocational education. Judging from the response to recent technical reports and demonstration programs, the field testing programs and requests, the interest shown from a consortium of the twenty-one largest school systems in the country, and other factors, outcomes of national significance will likely be verified over the next several years. Project ABLE has effectively demonstrated the applicability of newly developed educational technology but not within the cost range originally anticipated. However, many educational experts knowledgeable in the

areas of instructional technology have found the ABLE man-hour projections for the type of rigor and sophistication expected of ABLE, to be quite appropriate. The methods developed and/or adopted by ABLE in defining educational objectives, deriving course content, individualizing instruction, measuring student achievement, and evaluating program results may well be, as one eminent educator stated, "of remarkable and unusual excellence" and "well-nigh universal in acceptance."

Additional outcomes of national significance will include:

1. A management system for instructional system development process, complete with accountability features, project performance standards, checklists and research instruments, man-hour predictive factors, PERT milestones and activities, etc.

2. A regenerative evaluation system with corrective iterative feedback loops (designed for program improvement) incorporated into the instructional system development process.

3. A unique "hands-on" individualized instructor training program.

4. A new set of performance objectives and standards for instructors.

5. A student tracking system and application of student feedback devices which can provide most of the information and service presently included in computer support equipment (i.e., Project PLAN). This is a low cost student operated mechanical system which can provide interim relief to the inordinately high costs of present day computer systems.

6. A breakthrough in developmental techniques for the kind of individualized learning process, system, and materials intended for Project ABLE and widely advocated for vocational-technical education. Job analysis techniques for job family clusters, appropriate derived performance objectives, criterion performance evaluation instruments, learner activity guides, etc. are among the accomplishments. Assessment of student skills and knowledges (in the areas developed) is now possible. Teacher and student behavior has been noticeably changed with programs of individualized instruction geared to the capability and interests of individual students with the flexibility to meet the variance in individual

learning styles. (See Figure 3, Individualized Learner Activity Process Within an Instructional System.)

7. Cooperative testing of such systems, techniques and materials with the Philadelphia, Baltimore, and other school systems. The two larger cities at the time of the preparation of this report were setting up operations in four predominantely all-black schools. Philadelphia was to include one group of 10th grade dropouts (students who have re-entered school). Baltimore was to include one group of special education black students with reading levels ranging between the third and fifth grade. Other ES'70 network members have requested ABLE services (such as the Booker T. Washington school in Houston, Texas) but could not be accommodated because of funding limitations, phase-out activities, and commitments to a series of final reports.

8. The highly favorable reactions have been received from publishers (along with dismay at the level of funding and investment which will be required to complete the development).

9. Adaptation by other research projects of ABLE developed technology.

10. A nearly unanimous acceptance of the techniques and methodology as a model for vocational-technical education by those persons reviewing the recent technical reports and visiting the operational programs.

The demonstration of the feasibility of highly flexible planning of vocational education for the individual student, incorporating goals of vocational competence, including positive attitudes toward work, effective work habits, and standards of performance has been reviewed in recent technical reports with documentation provided on the power mechanics and general woodworking curriculum. However, claims of accomplishment of the model in which the goals of responsible citizenship and individual self-fulfillment were to be presented by concrete description cannot be made at this early date. The elements of Figure 2 are not complete. The academic, arts, and guidance programs have not been adequately cycled through the developmental process. Graduates are not yet available. The field testing is not far enough along and the present testing population is

too small at this time. However, the evaluation process has been established and is being placed into operation by Quincy, the field test participants, and a consortium of the country's largest school systems.

Increased amounts of student motivation and achievement, related in unusual ways to background and ability factors, have been cited in the limited programs undertaken in Quincy. For example, as noted in the reports on the power mechanics and general woodworking programs, several students with low reading abilities, at the elementary school level, had successfully accomplished all course objectives. In the power mechanics, one ABLE group outperformed a more advanced traditional class when compared on basic and frequently performed job tasks. In general woodworking, the number of objectives accomplished by students were greatly increased over a previous year while recorded discipline infractions were greatly reduced. Similar progress was reported in the electronics programs at the first two job levels. However, the number of students involved was too small for an effectively controlled research program. Furthermore, the student activities occurred in situations where staff enthusiasm may well have had an effect on program success. Thus the reason for the importance attached by the research staff to the field testing activities and the follow-up and continuation activities established for Quincy. The stage of testing in the academic areas is such that no attempt at such assessment should be made. Here, the formative kinds of development and evaluation must be completed. In the guidance area, experimental-control group testing was undertaken prematurely. The audio-visual aids required for most of the student activities as specified within each kit at each grade level were not purchased and made available until late in the school year during which the test took place. Furthermore, the grade reading level of the student kit materials was too high. Here, the necessary revision should have been made prior to city-wide implementation. It would be most difficult to make an assessment of student motivation and achievement as a

result of having used the excellent set of guidance reference materials and occupational analyses for each of the job family areas.

The development and application of techniques of providing instruction which takes full account of individual differences in ability, interest, and prior learning, have been met within certain limitations. The discussions relative to Figure 2 pinpointed the shortcomings and areas of needed development (see also Figure 3). From the descriptions of the ABLE process in this report and previous documents, there can be little doubt of the potential impact of ABLE research to individualized instruction in vocational-technical education.

The development and application of new materials for student guidance in the junior high years, in preparing students to take advantage of the opportunities offered by sound vocational education compatible with their interests and abilities, has met with limited success as described in this section and previous sections of this report.

The expected demonstration of high amounts of vocational competence and versatility on the part of graduates of vocational and technical courses cannot be assessed without a long term continuation of follow-up activities. However, until an adequate test population is established and field test sites are in operation, a heavy investment in such summative forms of evaluation would not be acceptable. Here, it would seem as though all components of the "Grand Design" including vocational, academic, the arts, guidance, and other factors should be functionally operational prior to scheduling such an assessment.

The design and establishment of a continuing system for evaluation of vocational education in the Quincy Public Schools in terms of procedures for assessing outcomes following graduation, have been provided in the Fifteenth Technical Report.

The set of reports and associated instructional materials which will account for the study and its findings, intended for the widespread dissemination of practical techniques,

results, and conclusions are enumerated within the List of Attachments.

Goals of the project. The major goal or objective of the project embodied a number of subordinate goals. In the accomplishment of such goals, it was expected that newly developed educational technology would be applied to the design, conduct, and evaluation of vocational education. Adequate documentation has been provided to substantiate the fact that modern educational technology was appropriately and very successfully applied by the project in its research and development efforts.

The development of educational objectives was accomplished through the application of highly appropriate research procedures in only the pilot areas within the vocational program. Budgetary constraints prevented completion of all vocational family areas and academic programs. The guidance program has excellently prepared objectives derived through careful and well documented research procedures. As noted previously, hundreds of instructional performance objectives stated in behavioral terms have been disseminated. The consideration to the goals of self-fulfillment and good citizenship were explored by a panel of eminent educators and implemented as recommended. However, inadequate development throughout the academic areas, the arts, guidance, the prerequisite program of instruction at the junior high level, and the inability to conduct a long term evaluation before completion of this final report makes evaluation of the self-fulfillment and good citizenship goals somewhat difficult, if not impossible, within the scope of the funding provided.

The description of needs for prerequisite learning in junior high years was undertaken early in the project but curtailed as a part of a series of cut-backs and modifications of project scope of work. The behavioral analyses performed for the electronics, power mechanics and general woodworking areas has provided information which will be of value in the description of needs for prerequisite learning. However, the research in the remaining job family areas must be completed before such goals of prescription learning can be accomplished

at the junior high level. It should be noted here, however, that the completed and published Project ABLE Occupational Analyses for the eleven vocational families constitutes a major milestone in the research efforts of the junior high program.

Effecting changes in student viewpoints toward the new school as a project goal cannot be evaluated. The ABLE program is neither complete nor have the pilot programs been operational for an adequate period of time. The fact that enrollments in several ABLE programs have increased at a much higher rate when compared to the overall school rate of increase, is encouraging, as are the reduction of recorded discipline problems. However, as noted before, the small number of students enrolled in the ABLE program and staff enthusiasm in the research program make such evaluation tenuous. Furthermore, the student guidance activity and the kits intended to assist the students in career decision making at the junior high level are in need of modifications. In the manner conceived during the preparation of the proposal for the project, the entire program with all supporting elements (which would be required to make significant changes in student viewpoints and achievement) was not possible to accomplish in the time period and at the level of investment requested. Of course, subsequent continuation proposals for each project year resulted in a modification of original project goals. A major effort of national scope will be required if the elements, goals, and procedures as graphically illustrated in Figures 1, 2, and 3 are to be realized.

The goals of individualized instruction, student evaluation, and program evaluation have been discussed at some length in this document and the recent Fifteenth Technical Report. It is in these areas that Project ABLE has made its major contribution in terms of potential national significance and widespread application. The accomplishments have been well documented.

The principal goal of demonstrating the increased effectiveness of instruction whose content is based upon explicit derivation from analysis of desired behavior after graduation cannot

be claimed as having been achieved on the basis of the success as described for the subordinate goals. Success in pilot programs is not an adequate indicator of the success of the principal goal in a situation where many components of a major total operating system were never completed. Furthermore, follow-up of graduates (not yet possible) over a period of years will be critical to the questions which must be posed in an assessment of the principal goal. The Quincy continuation and the field testing activities are a step in the right direction. However, in terms of the total program design presented in the initial ABLE proposal and in terms of the goals and ideals of Quincy and other school systems which have so readily embraced the ABLE concept, a massive effort will be required to come to grips with the kinds of problems it was hoped ABLE could solve.

RECOMMENDATIONS

I. Vocational and technical education is facing a critical need for instructional systems development such as that characterized within the original goals of Project ABLE and groups such as the Council of the Great Cities Schools and ES'70. However, progress across the nation in the development of individualized instructional systems for vocational and technical education has been disappointing. Several vocational directors of large city school systems have cited curricula and curriculum development as their major problem area. It is, therefore, recommended that the following tasks be undertaken:

1. Instructional systems (of the ABLE design) for the larger job families should be developed, implemented, field tested, and nationally disseminated. This development should take place in the school systems of our metropolitan areas through a coordinated and cooperative effort.

2. The application of effective management and evaluation techniques (again of the ABLE design) should be undertaken in the urban cities of this country as an integral part of instructional systems development and operation.

The need for the accomplishment of these tasks is well documented and, of course, accomplishment of each of the tasks is dependent on one another. Naturally, the process must be financially desirable. The process must also result in early operational instructional programs. Indeed, the President, Congress, the profession, and the populace are demanding immediate visible evidence of quality educational products and programs. Accountability features through performance contracting will be a key factor. Assessment of project, programs, products, teachers and students must be an integral part of the process and the emphasis in assessment must be on continuing program improvement--a truly regenerative process with corrective feedback mechanisms.

Related to Tasks 1 and 2 is the need to accomplish field testing and dissemination of instructional systems presently under development by Project ABLE. These programs are Power Mechanics, Woods, and Electronics. Since only portions of the three job families have been developed, the advanced levels should be completed. More important, with respect to the needs of the major metropolitan areas, is the same kind of development in many other job family areas, which should be undertaken immediately in each of the partner school systems--development which could, in turn, be field tested by participating members. The outcome of such activity would include the establishment of fully operational exemplary demonstration programs. Such demonstration areas should then become centers for the training of curriculum developers and teachers, and the focal point for national dissemination. This may be the only functional way of training curriculum R&D staff. And, this is likely the only way relevant teacher-training programs can be conducted--hands-on, under live conditions, through the kind of procedures advocated for the students (including use of performance standards and learner-centered individualized instruction). Obviously such exemplary demonstration programs would serve many functions, as do the existing ABLE instructional systems.

No individual school system, sponsor, agency, industrial or private developer, or research organization could possibly accomplish all of the defined tasks. It is also unlikely that any one school system in cooperation with a research organization (such as the original ABLE operation) could make any sizable contribution of national significance to the curriculum needs in vocational education. The problem in the area of learner-centered vocational curriculum development is simple to define--inadequate resources. This would include the lack of a systematic application and concentration of available funds, and the inefficient use of available trained staff.

Furthermore, on a small and limited basis, the current method of curriculum development (teachers writing for personal classroom use) is not practical because of the lack of assessment,

uneven quality, and questionable benefits from the high development cost. We can now accept the fact that a rather high level of funding is necessary for developing instructional systems. Such a level of funding can be justified only if the materials and systems can be used widely. Such replicability requires a high degree of quality control in the developmental process. Quality control cannot occur without proper and effective management and evaluation procedures. This is not possible without the direction of highly structured performance-accountability type contracts. Such contracts require experienced and competent research and management personnel to structure and implement the contracts. Effective policy direction is necessary, and expert technical advisors of national stature are needed to monitor development and implementation. In short, the developmental effort must focus on system design analysis, management by objectives, technology of instruction, quality assurance and performance, and accountability contracting.

A proposed solution to these problems is reasonable and practical. The plan is based on the high probability that a cooperative approach by several large school systems with effective research support and management assistance would be able to gather the financial resources (Federal, State, local, industrial) to accomplish the tasks. From this base, each school system would sponsor (i.e. with the kinds of funding now available as a result of changes in recent Federal legislation) independent development in one or more specific job family areas. This would also enable a concentration of resources within each city and reduce the duplicated effort now taking place within and among such school systems. For example, Quincy could reduce its usual curriculum development efforts in job family X (since one of the field test participants or one of the other metropolitan systems would be concentrating resources in that area) and divert its resources to work in area Y. Widespread use, relevancy and applicability in the other cooperating schools, and on a state and national scale as field testing progresses, would be assured through the highly structured management procedures. This would be accom-

plished by the effective direction of a policy group of one of the major educational consortiums.

It would be necessary for each participating school system to establish exemplary demonstration centers for local, state and national dissemination for the job family under development. This would also be the center for the training of instructors and curriculum development support personnel. (Here, Quincy, with its operational program, could be of service during the early stages as a training center.) More important, the investment (through reciprocal activity in the other partner systems) would result in the early establishment of additional demonstration centers for other job family areas. This is a kind of "pay for one and get a dozen" bargain, and such proliferation of quality instructional systems at the "grass roots" level is a highly desirable outcome. Again, it is only through centralized coordination and quality control procedures with a number of locally initiated and supported developmental units, that the desired results and products would be guaranteed. Actually, the development would be in a way decentralized, in order to gain access to the student target population during the critical initial develop/test/revise/retest cycles of instructional systems development process.

In summary, the major advantages of this proposed plan include the ability to:

1. Spread costs among agencies, governmental levels, states, cities, and schools.
2. Concentrate resources from several geographical areas.
3. Eliminate redundant activity and thus realize needed economies.
4. Insure centralized quality control.
5. Develop disseminable products and replicable instructional systems.
6. Provide many schools, through the dissemination of quality products, the means for dispensing with irrelevant and inappropriate curriculum development.

The proposal is presented with the following assumptions:

1. Various states are interested in developing, demonstrating, and testing, within their states, innovative programs of the type being evolved through ABLE research.
2. Funding for such programs may be obtained from the respective state departments of education in the states of the Great City Schools.
3. Included in the undertaking would be representatives from the following organizations:
   a. State Department of Education, Trade and Industrial Education Division.
   b. A majority of the member systems of the Great City Schools and school systems within the local area at the dissemination stage.
   c. A nearby teacher education institution interested and involved in similar activities to provide in-service training in individualized instruction to project participants.

II. Dissemination of this report should be undertaken among the members of the Council of Great City Schools and among the members of the ES'70 network.

III. Dissemination of the newly revised Performance Evaluation Sets and Learner Activity Guides for the General Woodworking Core Curriculum and the Power Mechanics program should be undertaken among the Council and ES'70 members.

IV. Continuation activities and field testing should follow precisely the procedures established through ABLE research (and reported in the Fifteenth Technical Report). At some future date, a report should be submitted to USOE describing such efforts and reporting on follow-up evaluation which was not possible to conduct during the term of this project.

V. Reactivation of development of the second and third level Woods and Power Mechanics curricula should be undertaken. Much development has been completed in such areas. However, activity has been curtailed due to problems of funding. Even with the continuation activities by Quincy, it is doubtful that local funding can be adequate to complete such development. Since com-

pletion would have national application and use, funding and supervision should be at a similar level.

VI. Working agreements for the field testing of the Woods and Power Mechanics instructional system should be expanded and made available to those Council and ES'70 members wishing to cooperate with Quincy and AIR in such activities. (Restrictions due to budgeting limitations have not permitted the widespread sharing of materials developed in Quincy.) Here, an appropriate evaluation will require a test population of adequate size. Furthermore, a broader distribution in terms of student population and geographic location than that now possible will be required if validity and reliability of test results are to be assured. The proposed experimental field test programs should be considered pilot demonstration projects with the additional objectives of acquainting school instructors and administrators with instructional systems of the type described in this report. The proposed programs should also serve the function of training local school staff in the procedures of developing, implementing, and evaluating systematized programs of individualized instruction. Inservice training in the process of individualizing instruction should be initiated and carried through. Every effort should be made to establish such pilot programs as exemplary demonstration models. This means equipping with appropriate audio-visual materials and equipment, training aids, references, furniture and shop equipment.

VII. Quincy and AIR should reprocess the RFP on the guidance reference materials (Occupational Analyses) for commercial dissemination under the limited copyright provisions provided by the Federal government. The requirements for revision of the student kit materials should be dropped since publishers are not generally willing to invest a large sum of money in revisions and field testing.

VIII. Quincy and AIR should seek additional support through possibly a new project or contract, in order to complete the development of the student guidance kits. Much time, effort,

and money has been invested. The need is recognized--something must be done. It should be possible to complete the ABLE guidance program at a very reasonable cost.

IX. The proposal which was prepared and not submitted on the multi-media development of existing ABLE learning modules and activities should be rewritten and processed. Such an effort takes on added importance with the inclusion of several ghetto schools now involved in the field test activities.

SELECTED REFERENCES

NOTE: References are listed by the sections shown below. However, references are listed under one section only. This was done even though several such publications could appropriately have been included in two or more of the subject groupings.

PROJECT ABLE

INDIVIDUALIZED INSTRUCTION

FEASIBILITY STUDIES

JOB ANALYSIS: TASK DESCRIPTION AND TASK ANALYSIS

ALLOCATION OF TRAINING

INSTRUCTIONAL OBJECTIVES

PROFICIENCY MEASUREMENT AND CRITERION REFERENCED ASSESSMENT

PROJECT ABLE

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APPENDIX A

TECHNICAL REPORT SUMMARIES

CONTENTS

REPORT SUMMARIES

Fifteenth Technical Report — 30 April 1970
Management and Evaluation Plan for Vocational-Technical Education.

Sixteenth Technical Report — 31 July 1970
The General Woodworking Core Curriculum.

Seventeenth Technical Report — 30 September 1970
The English Curriculum.

Eighteenth Technical Report — 30 September 1970
Testing of the Guidance Program.

FIRST QUARTERLY TECHNICAL REPORT

30 June 1965

DEVELOPMENT AND EVALUATION OF AN EXPERIMENTAL CURRICULUM FOR THE NEW QUINCY (MASS.) VOCATIONAL-TECHNICAL SCHOOL

FOREWORD

This report, submitted in compliance with Article 3 of the contract, summarizes the technical progress of Project ABLE during its first quarter of operation, 1 April to 30 June 1965. A brief overview of the project is presented first. Then, following in order, are a report summary, a short review of project organization and schedules, discussions of specific technical topics and, finally, plans for next quarter. A number of appendixes supply details relevant to topics covered in the body of the report.

REPORT SUMMARY

This report summarizes technical progress to 30 June 1965. Activity during this initial period has been concentrated in behavior analysis and guidance program development. Identification, selection, and description of jobs for inclusion in the training program has begun in nine vocational areas and significant progress has been achieved in five of the areas. The present Quincy guidance program has been described and guidance objectives to support the new curriculum are under development. In its first meeting 26 June, the Advisory Panel reviewed the aims, procedures, and expected outcomes of the project and agreed upon procedures for development of instructional objectives. It is expected that during the next quarterly period the behavior analysis will be substantially completed, analysis of requirements in mathematics and social studies will begin, instructional and guidance objectives will be prepared in first form for review by the Advisory Panel.

SECOND QUARTERLY TECHNICAL REPORT

30 September 1965

THE PROBLEM OF DEFINING OBJECTIVES

FOREWORD

This report, submitted in compliance with Article 3 of the contract, reports on technical activities of Project ABLE during its second quarter of operation, 1 July through 30 September 1965. A brief overview of the project is presented first, followed by a report summary which includes a short review of technical schedules. The major portion of the report is devoted to consideration of educational objectives and includes a discussion of criteria for objectives followed by sections on defining instructional objectives in Project ABLE and on objectives for the guidance program. Plans for next quarter are outlined.

REPORT SUMMARY

During the present reporting period, technical activity has been concentrated on development of project objectives for instruction and for the guidance program. The objectives sought are unambiguous statements of successful student performance which include the criteria of success and the important conditions under which the performance is to take place. Before such objectives can be selected, a logical structure must be developed through which specific objectives can be related to the broad educational goals of the curriculum. This report reviews criteria for objectives, describes the necessary logical structure, and illustrates its application in Project ABLE. In addition, the development of objectives for the guidance program is reviewed and related to the development of instructional objectives.

During the immediately preceding quarter, activity centered on vocational analysis and review of guidance program needs, work which was an essential preliminary to the development of objectives. During the next quarter, the Advisory Panel will review objectives so far developed, objectives will be revised and augmented, and derivation of topic objectives will begin.

THIRD QUARTERLY TECHNICAL REPORT

31 December 1965

CURRICULUM IMPLICATIONS OF THE STUDY OF OBJECTIVES

FOREWORD

This report, submitted in compliance with Article 3 of the contract, reports on technical activities of Project ABLE during its third quarter of operation, 1 October through 31 December 1965. A brief overview of the project is presented first, followed by a report summary. The major sections of the report concern (a) the curriculum implied by the preceding study of objectives and (b) the development of topic objectives. Plans for next quarter are outlined.

REPORT SUMMARY

During the present reporting period, the principal technical activity has been the selection of a curriculum and the development of topic objectives within each course of study. In prior months, work on objectives emphasized the development of comprehensive maps of the total set of objectives applicable to a vocational-technical curriculum for Quincy. Once the domains of educational objectives were mapped, the task became one of selecting specific objectives for the curriculum from the very large number available. When the curriculum had been selected and planned, objectives for topics within the curriculum could be defined. This report summarizes the curriculum implications of our study of objectives, outlines a curriculum for the vocational-technical school, discusses the rationale of topic objectives and the procedures for deriving them, and reviews the major practical problems encountered.

During the next quarter, derivation of topic objectives will continue, development of instructional materials, methods, aids and procedures will begin, and detailed plans for the Junior High guidance program will be completed.

FOURTH QUARTERLY TECHNICAL REPORT

31 March 1966

A VOCATIONAL GUIDANCE PLAN FOR JUNIOR HIGH SCHOOL

FOREWORD

This report, submitted in compliance with Article 3 of the contract, reports on technical activities of Project ABLE during its fourth quarter of operation, 1 January through 31 March 1966. A brief overview of the project is presented first, followed by a report summary. The major portion of the report is devoted to presentation of the vocational guidance plans for junior high school students. Project plans for next quarter are outlined.

REPORT SUMMARY

During the present reporting period, technical activity centered on the derivation of topic objectives for each course of study and on the completion of junior high school guidance program plans. Since the work in vocational analysis and in curriculum development, including the derivation of topic objectives, has been described in previous reports, the present report is devoted to the guidance program which has been developed concurrently with the other project activities. This report reviews the procedure being followed to develop the guidance program, summarizes the status of program development, identifies and discusses the principles employed to guide planning for the junior high program, and describes the junior high plan for achieving each objective of the guidance program.

During the next quarter, instructional materials, methods, aids, and procedures, as well as performance measures, will be under development. In addition, development of junior high materials to support the guidance program and guidance staff training will begin.

FIFTH QUARTERLY TECHNICAL REPORT

30 June 1966

THE ROLES, CHARACTERISTICS, AND DEVELOPMENT PROCEDURES FOR MEASURES OF INDIVIDUAL ACHIEVEMENT

FOREWORD

This report, submitted in compliance with Article 3 of the contract, reports on technical activities of Project ABLE during its fifth quarter of operation, 1 April through 30 June 1966. A brief overview of the project is presented first, followed by a report summary. The major portion of the report is a discussion of the development of performance measures to be used to assess students' achievement of the objectives of instruction. Project plans for next quarter are outlined.

REPORT SUMMARY

During the present reporting period, technical activity was directed primarily to (1) continued development of junior high guidance program materials and completion of arrangements for program implementation, (2) completion of course and topic objectives in some curriculum areas, and (3) the beginning of development of measures for verifying students' achievement of instructional objectives. The present report is concerned with achievement measures. It reviews the curriculum structure and instructional methods which have been planned and identifies a number of important roles for which achievement measures are needed. The technical requirements for measures employed in those roles are examined and the procedures for developing such measures are discussed.

During the next quarter, test development will occupy a greater proportion of total activity. Selection and development of instructional materials, aids, and procedures will continue concurrent with the development of measures. Junior high guidance preparations will be completed and the program will be initiated.

SIXTH QUARTERLY TECHNICAL REPORT

30 September 1966

THE DEVELOPMENT OF LEARNING UNITS

FOREWORD

This report, submitted in compliance with Article 3 of the contract, reports on technical activities of Project ABLE during its sixth quarter of operation, 1 July through 30 September 1966. A brief overview of the project is presented first, followed by a report summary. The major portion of the report is a discussion of the development of learning units by which students acquire the capabilities that are the objectives of instruction.

REPORT SUMMARY

During the present reporting period, technical activity concentrated on (1) completion of materials, staff training, and implementation arrangements for the junior high guidance program and start of the program in all junior high grades, (2) development of measures for assessing student achievement of instructional objectives, and (3) the design of learning units for the curriculum. The present report is devoted to the problems, procedures, and principles of developing learning units. It reviews the process whereby learning units necessary to the achievement of objectives are identified, describes the principles and methods for the design of learning units, and discusses some implications of the resulting curriculum for the teaching and administrative functions.

During the next quarter, the design of learning units and the related measures of achievement will constitute a major portion of the technical activity. In addition, procedures for evaluation of the junior high guidance program will be devised, development of senior high guidance objectives will continue, and the Advisory Panel will meet to review products and to consider the problems of implementing the program.

SEVENTH QUARTERLY TECHNICAL REPORT

31 December 1966

THE SEQUENCING OF LEARNING UNITS

FOREWORD

This report, submitted in compliance with Article 3 of the contract, reports on technical activities of Project ABLE during its seventh quarter of operation, 1 October through 31 December 1966. A brief overview of the project is presented first, followed by a report summary. The major portion of the report addresses the problem of selecting sequences for learning units so that students acquire the desired performance capabilities systematically and efficiently.

REPORT SUMMARY

During the present reporting period, technical activity emphasized (1) continued tryout of the junior high school guidance program and development of procedures and devices for its evaluation, (2) development of measures for assessing student achievement of instructional objectives, and (3) preparation of learning units. This report on the problems of designing effective sequences for learning provides a sequel to the preceding quarterly report on the design of learning units. Major sections of the report consider: the gross sequence established by general curriculum policies, the specific sequence requirements due to the structure of objectives, major factors affecting the efficiency of learning sequences, and empirical test and revision of the initial sequence design.

During the next quarter, the design and sequencing of learning units and the development of the accompanying achievement measures will absorb a major portion of project activity. In addition, the collection of data for evaluation of the junior high guidance program now in tryout will continue, development of senior high guidance program plans and materials will continue, and plans for teacher training will be outlined.

EIGHTH QUARTERLY TECHNICAL REPORT

March 1967

PROBLEMS RELATING TO THE DEVELOPMENT AND IMPLEMENTATION OF A VOCATIONAL CURRICULUM

ERIC Document Number ED 028 306

FOREWORD

This report, submitted in compliance with Article 3 of the contract, reports on technical activities of Project ABLE during its eighth quarter of operation, 1 April through 30 June 1966. A brief overview of the project is presented first, followed by a report summary. The major portion of the report is a discussion of the development of performance measures to be used to assess students' achievement of the objectives of instruction.

REPORT SUMMARY

This report describes the problems encountered while designing, developing, and implementing an experimental curriculum in a vocational-technical school. There are several dangers inherent in such a discussion because there is always a tendency to blame the inevitable inadequacies of the experimental program on the other fellow.

The failure to meet specific requirements of project development derives from a number of sources, some of which can be attributed to gaps or loop-holes in the proposed methodology and some of which are the result of the unexpected. When each step is satisfied according to the plan, the resulting product usually has a greater chance of being implemented effectively in a live school setting. However, any design that fails to leave room for adjusting to the unforeseen is lacking in itself. The realities of the implementation phase almost always reveal significant gaps in the design and development phases--the largest gap usually being the failure to prepare an adequate design for implementation.

The initial enthusiasm associated with involvement in an experimental curriculum must be maintained through the tedious work of development and implementation. When any part of the process is separated from the whole, the loss of perspective which develops results in actions which often negate or impede the forward movement of the effort. The "old" ways are always near, and may be retrieved to fill any gap appearing in the new design. Although this may be necessary at times, such fixes tend to be retained rather than serving as a temporary filler until the innovative step is formalized and tested. Experience has demonstrated that this often becomes the case and it further diverts the outcomes from the original project goals.

The description of the problem should be followed by suggestions for solving the problem. However, in most instances, the solution can be derived from the original specifications of the project methodology. Thus, there is a tendency to rewrite previous discussions which deal with specific aspects of the problem. In fact, the problems usually represent deviations from the proposed scheme. When methodology is properly applied, the resulting product will probably meet the rigid criteria established within the framework of original project specification.

The problems discussed in the report are divided into four major sections:

I: General Curriculum Development
II: Development of Specific Learning Units
III: Implementation
IV: Tryout and Revision

In some cases, problems associated with one section reappear, or may be solved in later sections. There are recurrent problem trends which persist, however, regardless of attempts to control or eliminate them. Many of these are associated with personnel changes occurring through the development phase. Particular sets of skills and attitudes are required to maintain consistent progress toward project goals. Training new personnel or re-training persons who have been on leave from the project for any duration limits the effectiveness of the products.

It is necessary to point out from the beginning that the responsibility for failure in any given dimension is a joint one. Inexact or incomplete coordination yields results which lack structural coherence and strength. Once the problems have been defined clearly, preventive courses of action can be specified and implemented.

It is hoped that the resulting report will specify problem dimensions with enough clarity to yield constructive resolutions for those attempting similar project efforts.

NINTH QUARTERLY TECHNICAL REPORT

30 June 1967

DEVELOPMENT AND TRYOUT OF A JUNIOR HIGH SCHOOL STUDENT VOCATIONAL PLAN

FOREWORD

This report, submitted in compliance with Article 3 of the contract, reports on technical activities of Project ABLE during its ninth quarter of operation, 1 April through 30 June 1966. A brief overview of the project is presented first, followed by a report summary. This report describes the preliminary tryout of a Student Vocational Plan for junior high school. Project plans for the following quarter are also outlined.

REPORT SUMMARY

During this reporting period, technical activity centered on the development of learning units and of proficiency measures for vocational and academic courses of study.

The outline of a vocational guidance program for junior high school students was presented in the Fourth Quarterly Technical Report. This report describes the steps taken to translate the objectives into an operating program, to conduct the preliminary tryout of the Student Vocational Plan, and to establish a basis for immediate and long-term evaluation of the program.

In summary, this report reviews the significant characteristics of the guidance program, and describes the materials developed to support that program. Staff preparation, tryout procedures, and plans for future program implementation and evaluation are also described.

Activity in the next quarter will focus on the continued development of learning units and accompanying proficiency measures, arrangements for teacher preparation in using experimental curriculum materials, development of instruments to monitor the introduction of materials in the classrooms, and completion of guidance program revision and implementation in junior high schools.

TENTH QUARTERLY TECHNICAL REPORT

31 May 1968

THE MATHEMATICS CURRICULUM

FOREWORD

This report, submitted in compliance with Article 3 of the contract, reports on technical activities of Project ABLE during its tenth quarter of operation, 1 April through 30 June 1968. A brief overview of the project is presented first, followed by a report summary. The major portion of the report addresses the problem of developing the mathematics curriculum learning units.

REPORT SUMMARY

During the present reporting period, technical activity concentrated on (1) crystalization of : curriculum unit topics, semester objectives, sequences of learning units, and syllabi for specific vocational areas, in mathematics, (2) analysis of the verbal and mathematical aptitude, ability and achievement characteristics of the mathematics student at Quincy, and (3) the development and testing of learning units in mathematics. The present report presents the history of this activity. It traces the development of the mathematics curriculum and displays the end product from its theoretical conception, to the identification of learning units, the establishment of semester objectives, the sequencing of the learning units, the formation of syllabi in specific vocational areas, the analysis of the learner population and the actual writing and testing of learning units. This report also includes a rationale for the curriculum as a whole and a rationale for the semester objectives.

During the next quarter, the development of curricula in the form of writing and testing learning units in other academic areas will constitute the major portion of technical activity. In addition, evaluation of the senior class guidance program will continue.

ELEVENTH QUARTERLY TECHNICAL REPORT

31 January 1969

THE ELECTRONICS CURRICULUM

ERIC Document Number ED 029 156

FOREWORD

This report, submitted in compliance with Article 3 of the contract, reports on technical activities of Project ABLE during its eleventh quarter of operation, 1 October through 31 December 1968. A brief overview of the project is presented first, followed by a report summary. The major sections of the report concern (a) the derivation of objectives for grades 10 and 11, and (b) the implementation and present evaluation of the grade 11 curriculum.

REPORT SUMMARY

This report describes the development, implementation, interim evaluation, and the probable future of the Project ABLE first and second level electronics curricula. The development stage of the project included the selection of jobs for training, the analysis of incumbent tasks, and the stating of course objectives in behavioral terms. The development stage was completed with the preparation of instructional materials which would lead the student, at his own rate, to the accomplishment of the stated objectives.

Implementation of the program, with continuing student and material evaluation, was the next phase (and well underway at the time of the preparation of this report). Most of the 18 students involved have accepted the responsibility for learning, and have demonstrated improved work and study habits. Student interest and progress is encouraging even to the casual observer. The attainment of objectives according to available data, has in some cases been lower than the established standards. However, revisions of the study materials and a refinement of the performance evaluations, according to recent tests, should remedy the problem areas.

Evaluation and revision of the materials on the basis of performance data will take place upon completion of the 1968-69 school year. Revised programs for 1969-70 will be operational for all first and second level students. The third level programs are presently under development and will undergo a limited test during the 1969-70 school year. Implementation of operational programs for fall of 1969 will include: (1) a non-graded electronics department for vertical and horizontal transfer irrespective of the school calendar, (2) a flexible program of individualized scheduling and course selection, (3) a limited test of the third level radio-television repairman and electronics technician programs, (4) the beginning of a third level cooperative work study program.

TWELFTH QUARTERLY TECHNICAL REPORT

July 1969

The Power Mechanics Curriculum

REPORT SUMMARY

This report describes the development of the Project ABLE Power Mechanics program. A brief review of the goals and objectives of the Project is included along with a rationale for the Power Mechanics curriculum.

The process was initiated by a careful analysis of occupations which formed what is termed a job family. The occupations were analyzed for common skills and knowledges. Also considered were job requirements, conditions, trends, and other factors. The jobs were then categorized and ranked by hierarchies of skills and knowledges. Training vehicles or representative jobs were then identified and a flow chart for the job family developed. Job descriptions and task enumerations were followed by a task analysis. Behaviorally stated objectives derived from the task analysis were translated into criterion tests called performance evaluations. Highly structured learning units were also developed to facilitate the implementation of a program of individualized instruction.

Major documents and samples of instruments, performance evaluations, learning units, and other materials are included in the report. A description of the initial procedures used in testing and revising, along with appropriate data, is provided. The report will serve as an administrator's and instructor's manual for institutions wishing to test the program. For this purpose, information is included for the organization, implementation and evaluation of the program. Training aids, tools, supplies, references, and items that are similar, are listed in detail.

THIRTEENTH TECHNICAL REPORT

September 1970

THE SOCIAL STUDIES CURRICULUM

REPORT SUMMARY

The contents of this report include the evolution of the Project ABLE three-year social studies curriculum for vocational students. It traces this development from the early meetings held by the advisory panel which set general social studies objectives for non-college bound students, through the writing of specific learning units designed to meet those behavioral goals, to the present activity of continued development and revision of learning materials. Particular attention is paid to the attempts at implementation and the problems associated with the evaluation of these learning units in an experimental classroom situation during the 1968-1969 school year in Quincy, Massachusetts.

FOURTEENTH TECHNICAL REPORT

September 1970

THE SCIENCE CURRICULUM

REPORT SUMMARY

This report describes the activities concerning the Science Program of Project ABLE in the Quincy Vocational-Technical School.

1. In accordance with the principles and purposes of Project ABLE, a Rationale was established, upon which the Science Program is based.
2. The next step was a statement of course objectives which relate to the Science areas incorporated in the program.
3. After the scope and the content of the Program were established in these two statements, a number of guidelines, techniques and rules of educational application had to be clarified for writing the curriculum. The use of audio-visual media, the selection of text and reference books, and the incorporation of experiments constituted an integral part of the development.
4. The individual Learning Activities were structured, a method of evaluation worked out and an instrument for measurement devised.
5. At the beginning of the school year 1968/69, the implementation of the first sets of developed material--Perception and Biological Science--was begun and continued through the school year. Concurrently in 1968/69, the writing of the Physics curriculum was continued and made ready for implementation.
6. Tasks remaining at the end of the reporting period were: (a) the analysis of student and teacher evaluations and its application in the procedure of revisions, and (b) the implementation of the remaining part of prepared curriculum and its revision.

FIFTEENTH TECHNICAL REPORT

April 1970

Management and Evaluation Plan
for Instructional Systems Development
for Vocational-Technical Education

REPORT SUMMARY

The report presents the Project ABLE management and evaluation plan for the implementation of experimental vocational curricula. A brief review of the goals and objectives of the project is included. A review of the literature is provided for the purpose of defining and clarifying the rationale for the management and evaluation plan for instructional system development. Major emphasis in the plan is given to formative evaluative procedures drawing on student performance data as the primary source of corrective feedback. The system is designed around an iterative process with the major goal of continuous program and product improvement. It is felt that such an approach would provide a regenerative element with self-renewal and updating taking place as a result of the evaluation, validation and follow-up activities. It is shown how test/revise/retest cycles can and should be perpetuated for as long as the program is in operation.

The primary evaluation instuments are derived from job and task descriptions and the subsequent specification of behaviorally stated performance objectives. This entails a detailed breakdown of the task activities and an identification of the "critical incidents" which are then translated into criterion checklist instruments. Criterion instruments, called "performance evaluation modules", are also developed from the task descriptions for the purpose of structuring replicable and reliable assessment situations. The performance evaluation modules are also designed to permit effective class management. While such instruments incorporate objective paper-pencil items, the emphasis is on the more important "hands-on" or practical performance skill test activities. Self-scoring response and feedback techniques with numerous simulators, mock-ups, samples, and other aids are emphasized in recognition of the critical role such devices play in a functional instructional system.

The entire developmental effort is characterized by a system approach centered around successive tryouts and systematic testing. Procedures for the design and application of developmental and evaluative instruments are presented in considerable detail. Sample materials are included along with flow charts, work sheets and various system control documents. Management procedures are defined and the entire process carefully documented. A plan for summative evaluation is outlined and guidelines suggested for appropriate application. Sample instruments for both formative and summative evaluation are included.

SIXTEENTH TECHNICAL REPORT

July 1970

The General Woodworking Core Curriculum

REPORT SUMMARY

This report describes the development of the Project ABLE General Woodworking Core Curriculum A brief review of the goals and objectives of the Project is included along with a rationale for the development of instructional systems.

The process was initiated by a careful analysis of a large number of occupations related in one way or another in the Woodworking family. This enabled the identification of a number of clusters or sub-families. Such occupations were then analyzed for common skills and knowledges. One method employed was a frequency count of common tasks utilizing a matrix of job titles by tasks performed. Also considered were job requirements, conditions, trends and other factors. Flow charts for job family training were developed. Job descriptions and task enumerations were followed by task descriptions and task analyses. Behaviorally stated performance objectives derived from the task analyses were translated into criterion tests called performance evaluation sets. Extensive documentation of such efforts is provided in the appendices.

Learner activity guides which include student-instructor options for maximum flexibility in selecting media and methods of instruction appropriate to each individual learner's needs, have been provided. Such devices are examples of attempts to meet major project objectives of individualization of instruction through the application of modern educational technology. Many documents and samples of instruments, performance evaluation modules, and other materials are included in the report. A description of the initial procedures used in testing and revising program materials is also included.

The report will serve as an administrator's and instructor's manual for those schools wishing to field test the instructional system. However, the report, for field testing applications, must be supported by descriptions and documents provided in the Project ABLE Fifteenth Technical Report, "The Management and Evaluation Plan for Instructional Systems Development for Vocational-Technical Education."

SEVENTEENTH TECHNICAL REPORT

September 1970

THE ENGLISH CURRICULUM

REPORT SUMMARY

This report discusses the development and implementation of an experimental tenth and eleventh grade English curriculum for vocational-technical students. The report includes an introduction which focuses on the educational methodology applied throughout the Project, the rationale for the English curriculum, a history of the early attempts at adapting English curricula for use with Project ABLE, a discussion of the development and implementation of the new curriculum, and recommendations for future implementation, adaptation and development. Samples of the materials developed for the English curriculum are appended to the report. These include the behavioral course objectives and samples of: learning units, student evaluations (tests), teachers' guides for implementation of units, and student reaction forms.

EIGHTEENTH TECHNICAL REPORT

September 1970

TESTING OF THE GUIDANCE PROGRAM

REPORT SUMMARY

The Project ABLE Guidance Program was designed to prepare junior high school students for making an appropriate and stable choice of high school program. The guidance plan was implemented with over 4000 students in Quincy. Experimental and control groups were established to assess the effectiveness of the new program and materials.

Generally speaking, the results of the testing program were inadequate, with many inconsistencies occurring in the data and on the student score sheets. Serious questions can be raised about proper administration of the pre- and posttest, the proper use of the student kit materials, the proper use of the required reference and multi-media support materials, the premature city-wide testing of materials in need of editorial change (e.g., reading level too high), and other factors.

Funds for the support of staff for the proper revision of the student kit materials have not been readily available. However, the set of twelve Occupational Analysis reference manuals are more functional at this stage of development, and are considered valuable; their continued use is assured by the Quincy guidance staff. On the other hand, it is recommended that the student kit booklets for grades 7, 8, and 9 not be reprinted until appropriate revisions and modifications can be accomplished. It is felt that further refinement of the materials and administrative procedures, better implementation, and a more exhaustive investigation of students' performance are sure to lead to more positive results. It is strongly recommended that the effort to build on the foundation of the present program be continued, enabling the full potential of the basic research and development to be realized.

APPENDIX B

A REVIEW OF PROJECT ABLE'S FIFTEENTH TECHNICAL REPORT: MANAGEMENT AND EVALUATION PLAN FOR INSTRUCTIONAL SYSTEMS DEVELOPMENT FOR VOCATIONAL-TECHNICAL EDUCATION

A Review of Project ABLE's Fifteenth Technical Report: Management and Evaluation Plan for Instructional Systems Development for Vocational-Technical Education

by

Anthony J. Nitko
John O. Bolvin

Learning Research and Development Center
University of Pittsburgh
Pittsburgh, Pennsylvania

September, 1970

GENERAL COMMENTS

The Fifteenth Technical Report compiled by Project ABLE entitled, "Management and Evaluation Plan for Instructional Systems Development for Vocational-Technical Education," represents a report that is well-organized and is a carefully planned adventure into curriculum and instructional systems development for vocational-technical education. The report places proper emphasis on development and implementation procedures that are to be systematically followed by all persons concerned with the implementation aspect of the final product.

SPECIFIC COMMENTS

Of particular merit in this report is the accountability procedures which delineate the work flow and responsibility of each person in the developmental process. The employment of task analysis to identify specific instructional objectives to be learned by students preparing for each technical job level is to be praised and emulated by all concerned with this type of enterprise. Curriculum and materials development projects which fail to perform this important step waste much time and effort in developing learning experiences that are ill-suited in preparing students for a particular type of job.

The stance Project ABLE has adopted in emphasizing formative evaluation and the developmental aspects, rather than the experimental single decision-yielding approach of traditional educational research, is of particular importance. Generally, it is expected that by integrating formative evaluation and development, additional information about system adequacies, inadequacies, and the nature of the improvement necessary would be more readily available than in a one-shot experimental approach.

The use of criterion performance measures is another plus in the system as outlined in the report. Using this manner of testing, it should be relatively easy to determine the degree to which each student is able to perform the kinds of tasks necessary for job success in the actual situation. It is our opinion that Project ABLE's interpretation of criterion-referenced testing

is correct. However, there are certain points throughout the report which are unclear. These points raise some questions which, if left unanswered, may lead to failure in meeting the Project's goals. These questions are randomly listed below:

1. Is there any provision in the development and design procedures for revision of the catalogue of skills that might be needed for various occupations? I.e., when the requirements for a particular job change, when (and how) will these requirements be fed into the instructional system to up-date it? Certain occupational areas are under constant and rapid change (e.g., electronics), while others may change rapidly during certain periods (e.g., when a technological breakthrough occurs). The current procedures do not appear to establish an instructional system that will be autonomous enough to incorporate these training changes immediately and automatically.

2. An important point of emphasis is the insistance of using commercially available materials rather than developing new materials. However, it is unclear as to the precise procedures that will be used to: a) select materials from the market, and b) validate those selected. The test/retest cycle states that this will be done, but the procedures are unclear. Will an entire group be used? Or will a single subject (student) use the materials first and this information in turn be used to get the gross "bugs" out of the materials?

3. It is also unclear as to what junior high school skills are prerequisite for each learning module (although skills from other vocational-technical learning modules are identified). It is stated that more academic skills will be integrated into the system, yet it is not clear how this will occur.

4. Is there any attempt to assess an individual's command of prerequisites before (or as) he enters each unit of instruction (be these prerequisites from other vocational-technical modules or junior high school prerequisites)? If so, where and by whom does it get done?

5. Although there is much written on how the student will operate in the instructional system, it is unclear how the teacher and teacher aide will operate. The statement concerning the classroom (training-shop) management system for more than one student is thus incomplete.

6. An important part of formative evaluation is determining which treatment (instructional method or procedure) is most effective for what kind of pupil. Some evidence should be gathered concerning individual differences with respect to the recommended set of learning materials. In this way, a more effective "contract" could be made between teacher and student. (This is the aptitude-treatment-interaction problem.)

7. It is pointed out that content-analysis, i.e., examining existing instructional materials, is a poor way to derive outcome objectives. Yet, existing manuals of operation and service manuals play an important role in the selection of instructional objectives. There seems to be some minor inconsistencies here. Perhaps the language used in the report can be revised to clear up this point.

8. The modification of items on criterion-referenced tests after tryout with an experienced group raises some issues. There is an implication (p. 71) that the criterion tests will be modified if the experienced groups do not achieve 85%. Dedication to this rule without further examination of the causes may lead to erroneous conclusions if the particular sample in the tryout group contains a number of individuals who do not have sufficient proficiency of some of the components of the task. (Perhaps, for example, the local job situation does not provide enough opportunity to perform or maintain certain skills.) Some cautions and criteria should be specified in the document as to when test items will be eliminated.

9. The concerned expressed in #8 above extends to the "non-experienced" group as well. Circumstances such as: a) those examiners with high aptitude being able to learn the task (or problem solution) at the time of testing, or b) the vicarious experience of certain members of the tryout sample being sufficient for achievement of some task components before formal

training could lead to erroneous revision decisions. Some procedure should be established to consider events like these before revision of tests.

10. Little is mentioned in the document about how the objectives in the area of "fulfilled citizen" will be attained and assessed. Should task analysis be used to identify the critical elements here? What learning experiences will be used in Project ABLE and how do they fit into this particular system of individualized instruction.

11. There is some discussion of Gagne's classification of instructional objectives. However, it is not clear how this classification will be used in the developmental effort. Perhaps they could be used as part of the criteria for materials selection since Gagne does recommend certain types of instructional experiences in the acquisition of certain classes of behaviors.

SUMMARY

In essence, the report is extremely good in specifying the procedures in curriculum development for Project ABLE. Of particular merit are:

a) The integration of development and formative evaluation,

b) The use of task analysis for deriving instructional objectives, and

c) The employment of criterion-referenced tests in pupil assessment.

Certain refinements need to be made, however, before the success of the Project can be reasonably assured. These include:

a) Specification of the classroom (or shop) management procedures with particular reference to the instructor,

b) An integration of learning theory, evaluation techniques, and task analysis into a system that will effectively select and validate instructional procedures, instructional materials, and tests, and

c) Specification of how academic, citizenship, and vocational-technical training goals will be integrated into the instructional system on an individual basis.

APPENDIX C

DOCUMENTS RELATED TO THE CONTINUATION OF PROJECT ABLE AS A LOCAL EFFORT FOR THE 1970-71 SCHOOL YEAR FOLLOWING THE COMPLETION OF THE USOE CONTRACT

Project ABLE

THE PUBLIC SCHOOLS OF QUINCY, MASSACHUSETTS AND THE AMERICAN INSTITUTES FOR RESEARCH

April 15, 1970

FROM: J. Nicastro

TO: Bill Phinney, Art Woodward, M. Daly, L. Creighton, & L. Babin, S. Sargent

RE: Use of ABLE Academic Materials

As you know, Project ABLE is scheduled to phase out soon. There are no funds available for further development or revision of academic materials. Meetings have been held with the academic coordinators and their respective department heads, to inform them of ABLE's termination activities.

The attached proposals express the views of each of the academic departments concerning ABLE materials. About $15,000. will be needed to provide individualized learning units to some 2100 secondary students.

It is the hope of the Project ABLE staff that funds will be made available for Quincy personnel to utilize these Quincy developed materials. Mr. Daly and Mr. Babin have accomplished some preliminary work toward a summer effort to train instructors. Possibly, that effort could be expanded to include part of the cost for revision of needed ABLE units. Any help which you might be able to provide toward funding of the revision and printing of the academic materials will be appreciated. Failure to provide funds could result in a severe setback in Quincy's individualization effort.

cc: Dr. Creedon
Tom White
Carl Deyeso
Vincent Sullivan
Miss Goudy
P. Chrisom
G. Neifing
J. Chrusciel
Mrs. King
R. Hutchison
C. McLaughlin
W. Pactovis
L. Day
W. Ullery

JSN/bc

A PROPOSAL FOR INDIVIDUALIZING ALL THE PRACTICAL MATHEMATICS PROGRAMS FOR THE VOCATIONAL-TECHNICAL SCHOOL STUDENTS AND ANY OTHER NON-COLLEGE BOUND AND NON-BUSINESS EDUCATION STUDENTS.

The Mathematics Department of Quincy High School presents this proposal which we feel epitomizes the goals of ES'70 and the individualized learning process to which the Quincy Public School System has said it is committed.

A. From out experience with the ABLE and PLAN materials, we feel that we can revise present ABLE materials to do two vital things not done presently:

   1. Relate the "ABLE" "core" mathematics units to relevant problems in the trade areas and general practical problems to which students need exposure in our society.

   2. Set up assignments for accomplishing objectives for various individualized reading and ability levels using regular texts, programmed texts and multi-media materials.

B. In developing necessary new or additional units for the newly structured Advanced Practical Math. I, II and Developmental programs we feel that we can make a marriage of "ABLE" and "PLAN". We can come up with a unit or module format which encompasses the best of what each now does, but additionally covers the two vital items listed under "A" above.

Attached are samples of a current ABLE and PLAN unit or module. Also attached is a sample of an additional page we would attach to a revised ABLE unit to accomplish "A" above. Thirdly, you will find a sample of what we might devise to cover a topic and objectives as outlined under "B" above.

Now down to the nitty gritty of the cost to accomplish what is being advocated:

$1,100.	Xerox reproduction of current ABLE units to handle estimated student enrollment.
350.	Xerox reproduction of units developed during summer.
1,800.	300 man-hours for revision and development of ABLE units during summer based on current contract rate of $6. per hour.
750.	Clerical work for the typing and reproduction of units.
No Cost	Collating of units.
No Cost	Textbooks, programmed texts, filmstrips, tapes, etc. can be obtained through existing available budgets. (We think we will need $100. for A-V hardware filmstrip viewers, but even this we feel could be obtained under some existing source.)
$4,000.	TOTAL COST

5/20/70

To: Mr. Sargent

From : Margaret King

Re: R & D Proposal " Individualizing All The Practical Math Programs for Q H S and Q H V T"

Thank you so much for the happy news that our Proposal has been funded for $2,000. We are all quite thrilled and enthused - gives us all a real shot in the arm!

There is a slight problem. As you know we will be writing up a number of new units which must be typed and reproduced. We Note that the salary for clerical is only $200. As it turns out only three instead of four teachers will be writing. Will it be possible for us to use more money for our dire need of clerical help so long as we do not go over the $2,000? We may end up less.

We would deeply appreciate your consideration on this.

Yours truly,

mk

Mrs.Margaret King
Head of Math Dept.

SCIENCE PLAN FOR FALL 1970

FOR USE OF INDIVIDUALIZED MATERIALS

Although discussions have been held, no definite commitment has been made.

It is estimated that enough written materials are on hand to conduct two or three classes of first level Science utilizing ABLE materials.

If more students than presently anticipated are to utilize the materials, then a reproduction cost will be involved as will an additional cost for lab materials.

SOCIAL STUDIES PLANS

FOR USE OF INDIVIDUALIZED MATERIALS

In order for the Social Studies Department to utilize the ABLE materials with some 800 students, the following funds are needed:

$1,728.	Xerox reproduction of needed ABLE units.
1,620.	270 man-hours for revision during summer; 3 teachers @ $6. per hour for 90 hours.
85.	A set of 20 transparencies.
45.	3 Shades for Room #208.
$3,478.	TOTAL COST

ENGLISH PROPOSAL TO ENABLE MORE THOROUGH INDIVIDUALIZATION

From the experience of the two programs, ABLE and PLAN, the English Department needs to have available for use many of the units and modules developed by the two programs for many of the classes not designated as ABLE or PLAN. Teachers of both programs have shared their materials as generously as we have indicated need, but to have them duplicated and perhaps made available for all from the English office would facilitate more extensive use.

To that end, the duplication of the selected ABLE materials should be provided.

The English Department of Quincy High School, therefore, submits this proposal which we feel will enable more thorough individualization in the language arts area.

We propose:

A. to make a major revision of student evaluations and to clean up materials for general classroom use.

B. to provide the basic English classes, which are primarily Vocational-Technical students, with materials that will enable the teacher to tutor the slow learners.

C. to provide the standard English classes with teacher-guided supplemental materials.

To accomplish the necessary revision and general preparation of materials satisfactorily, the cost will be:

$3,686.	Xerox reproduction of ABLE units for projected classroom use.
2,800.	700 man-hours for revision and development summer work: two teachers @ $6.00 per hour.
222.	Audio-visual hardware and software.
500.	Clerical--Typing
$7,208.	TOTAL COST

December 17, 1969

Proposals for Vocational Ed. Act 1968

NEW

1. Basic Vocational Program

7 Full time staff & Guidance	$120,000
Equipment	50,000
Building Alterations	30,000
	$200,000

2. Vocational Guidance Project

Occupational information) Computer Retrieval) Community involvement)	35,000

3. Cooperative Work Study for Educationally maladjusted (Disadvantaged)

Salaries	25,000
Equipment	10,000
	$35,000

4. Health Assistant

Salaries	10,000
Equipment	25,000
	$35,000

5. Library Assistant

Salaries	10,000
Expenses	5,000
	$15,000

6. Commercial Art - (Expansion)

Product Display	Staff	30,000
Industrial Design	Equipment	8,000
Production Photography	Supplies	5,000
		$43,000

OLD

7. Support of Present Projects

1. Support of ABLE Staff (Release Time)	30,000
2. Data Process. Back Up (ABLE)	12,000
3. Reproduction & Disseminations	10,000
	$52,000

City of Quincy School Department

Project Able Support

1. Quincy has been working on a vocational curriculum project (Project Able) financed by the U. S. Office of Education and in joint operation with the American Institutes for Research. It has been found to be impossible to complete the total curriculum project due to time limitations, and limited finances. The release of three full time instructors will enable us to complete a major portion of the work in vocational curriculum.

   The vocational guidance material, workbooks, and other material that has been developed in Project Able is outstanding, however, it should be developed in multi-media and computerized for access. If money can be allowed for this purpose, the materials of curriculum and guidance can be made available for further dissemination to other school districts.

THREE YEAR PERFORMANCE CONTRACT

Additional Duties for Project ABLE Coordinator

Because Project ABLE commitments may soon be easing off, the opportunity arises for Mr. J. Nicastro, as a staff member of the Research and Development Team, to begin to help in the accomplishment of certain tasks within the Quincy system. Two items of prime interest at this time are as follows: Present ABLE Project and the New Basic Vocational Program. If you agree that the two tasks should be accomplished, then paying for it is an item of prime importance. I suggest doing the following in order to man an Occupational R&D Unit within our present Research and Development Unit.

Assuming support of present Project ABLE 1 September, 1970,

1. leave Joseph Nicastro as coordinator (dual role). He would not have to be on board for ABLE activities all of the time, and some reimbursement might be possible. His salary would be from research funds as they are now. In other words, no additional cost but time would be made available for coordinating new activities for accomplishment of other tasks.

2. continue to utilize Glen Neifing on Project ABLE. In addition he will work on our new B.V.P. proposal and on other projects as needed. Either bring him on as a Quincy employee or pick him up as a research consultant as he is definitely committed to remaining in this area. His role in the occupational R&D Unit would be to furnish assistance to the Project Coordinator as needed and to work with other Quincy personnel.

3. retain Frank Leporini and Richard Forsyth to work in the Occupational Division of the R.D. Unit for the time it takes for completion of their areas of Project ABLE. Primary duties would be the continued development of vocational materials for the vocational materials development project Level II and III. Secondary duties would be to assist, as required, in other efforts.

By following the above recommendations, Quincy can continue in the development of secondary vocational materials, begin a strong Occupational Division of the R&D Unit to service non-college bound students in our system, and to do other tasks desired within the system.

Areas of Services

Instructional System Development for Vocational or Secondary Education.

Junior College Technical Division Programs.

Junior High School Career Exploratory Programs.

Audio-Visual Instructional Components.

Educational Research.

One additional item which needs to be considered is the need for continuation of Project ABLE demonstration laboratories. In order for Quincy to provide training for Great Cities instructors in Power Mechanics and Woodworking, shops will have to be operating in these two areas. With Mr. Leporini and Mr. Forsyth developing the second and third levels full-time, other instructors will have to take over the ABLE shop programs.

TO: Maurice Daly

FROM: Joseph S. Nicastro

FY-1969--$52,000
FY-1970--$52,000

RE: Proposed Allocation of Funds--Support of Present Project ABLE

	R&D Front Office Budget	Technical Staff	Clerical Staff	Materials & Supplies	Postage/ Communication	VOTEC Budget
* Support Staff						
Divided time coordinator	0					
Divided time research person (approx)		8,700				
1 full-time person--Power Mechanics (approx)		12,300				
1 full-time person--General Woods (approx)		15,200				
1 full-time person--P.M. Lab						0
1 full-time person--G. Woods Lab						0
* Secretarial/Clerical 1 full-time person			5,500			
* Materials, Supplies, Equipment Reproduction, Dissemination				9,000		
* Postage					500	
Communications School Telephone to be installed						
* Travel					800	
		$36,200	$5,500	$9,000	$1,300	

Grand Total $52,000

NEW BASIC VOCATIONAL PROGRAM

This plan is based upon several assumptions.

1. Quincy's proposal to the Department of Vocational Education in O.E. will receive some level of funding and will provide for the updating of Jr. High industrial arts activities.

2. Research has shown that elementary and Jr. High students do not have an adequate occupational knowledge.

3. Research has shown that many elementary and Jr. High students do not perceive of themselves as occupationally bound even though their academic record indicates they are not college bound.

4. Providing occupational information and some hands-on practice at representative job tasks will result in a change in occupational knowledge and in perception of personal career goals.

The mechanics of the plan is to equip a mobile unit with 20 sound on slide machines for presenting occupational information and for guiding students through the hands-on practice of representative job tasks, utilizing operating equipment and hardware.

The use of a mobile unit the first year will allow Jr. High students from all of Quincy's Jr. Highs to have access to the learning experiences.

A Vocational Knowledge and Interest Inventory Test will be used as a pre and post test to determine the extent of change (gain or loss) of occupational knowledge and perceptions of personal goals for all participating students.

If the tryout is successful, a permanent installation in each Jr. High can be pursued or the mobile concept can be expanded. A successful program will yield the following results:

1. Students will have changed their attitude about vocational education, will have accepted for themselves a non college career goal and will have gained some knowledge and skill in vocational areas.

2. Quincy will have once again converted educational theory into practice in an ongoing educational program.

3. A demonstration model will have been established for use by other school systems and a training site will be available should a cooperative effort come about.

4. Another segment of Quincy's (K-Jr. College) Vocational Education Track will have been completed and put into operation.

(Work Sheet)

TO: Maurice Daly

FY-1969--$200,000
FY-1970--$200,000

FROM: Joseph S. Nicastro

RE: Proposed Allocation of Funds--New Basic Vocational Program

	Staff	Clerical Staff	Materials Supplies	Equipment	Postage/ Communication	Other
* Staff Divided time coordinator (J.N.) Divided time research person (G.N.) 1 full-time Ind. Arts and/or Voc. 1 full-time Media person Divided time P/ABLE staff persons 1 full-time mobile manager (beginner Ind. Arts person) * Secretarial/Clerical 1/2 time person * Materials, supplies, reproduction, dissemination, equipment, tools * Postage/Communication (telephone) * Services						

July 10, 1970

TO: L. Babin

FROM: J. Nicastro

RE: Project ABLE--Needs for September, 1970-September, 1971

The attached memo spells out our needs in Project ABLE for the school year September, 1970-September, 1971 for personnel and space facilities as agreed. As I agreed with you the other day in your office--here are the results of that meeting which will give you some directions to pursue for our needs.

135 N. BELLEFIELD AVENUE, PITTSBURGH, PENNSYLVANIA 15213 □ (412)683-7600

July 10, 1970

TO: Dr. Lawrence P. Creedon, Maurice Daly, William Phinney

FROM: Joseph Nicastro

RE: Minutes of Meeting 7 July 1970
(Item #7, Support of Project ABLE) M. Daly's
(Item #1, New Basic Vocational Program) Voc-Prosals

Present were Project ABLE Policy Board members, I.P. Team members, Expanded team members, J. Osterman, C. Griffin, Arthur Gillis, S. Sargent, and Steve Moynihan.

Please review the following statements for accuracy as a summary of the 7 July meeting.

1) An Occupational Research and Development section will be manned within the present Research and Development Unit.

2) Joseph Nicastro will continue as coordinator (dual-role) for ABLE activities and for continuing new activities for accomplishment of other tasks as needed in Quincy. Two items of prime importance are maintaining the present ABLE activities and beginning the new Basic Vocational Program.

3) Frank Leporini and Richard Forsyth will be utilized in the Occupational Section of the R&D Unit for the time it takes for completion of their areas of Project ABLE. Primary duties will be the continued development of vocational material (ABLE Level II and III). Secondary duties would be to assist as required in other efforts.

4) The Occupational section of the R&D Unit will develop needed programs to service non-college bound students in our system and to do other tasks desired within the system.

Areas of Service

* Instructional System Development for Vocational or Secondary Education.
* Junior College Technical Division Programs.
* Secondary High School Career Exploratory Programs.
* Audio-Visual Instructional Components.
* Educational Research.

135 N. BELLEFIELD AVENUE, PITTSBURGH, PENNSYLVANIA 15213 □ (412)683-7600

5) There is a need for continuation of Project ABLE demonstration laboratories. (September, 1970 - June, 1971) In order for Quincy to provide training for Great Cities instructors in Power Mechanics and Woodworking, shops will have to be operatin in these two areas. With Mr. Leporini and Mr. Forsyth developing the second and third levels full-time, other instructors will have to take over the ABLE shop programs.

6) Office space will obviously be needed for a minimum of six people--Room 329 of the Voc-Tech school would be suitable with some modifications.

7) J. Osterman will determine the procedure for the hiring of a clerk for the Occupational Section of the R&D Unit. Also, Mr. Osterman will work with L. Babin to assure manning of the Project ABLE Power Mechanics and Woods labs, if additional personnel are required to replace F. Leporini and R. Forsyth.

8) The above items are based upon Quincy funding only for Project ABLE. If, as may happen, Great Cities and/or Federal funds become available, more instructors can be temporarily assigned to the Occupational section of the R&D Unit to speed up the development of vocational materials.

cc: I. P. Team
J. Osterman
S. Sargent
A. Gillis
Dr. C. L. Griffin
S. Moynihan
L. Babin

July 27, 1970

TO: Mr. Joseph Nicastro

FROM: Mr. Arthur S. Woodward

SUBJECT: ABLE

How many students do you expect to be able to accomodate in ABLE for 1970-71?

Should ABLE not be named "experimental" by Dr. Creedon for 1970-71, what additional capacity would you have?

(Reminder: Keep the electro-electronic in mind, and as to whether or not we bring it to IPT.)

August 4, 1970

To: Mr. Joseph S. Nicastro
Mr. William J. Ullery

From: William L. Phinney

Subject: Project ABLE - 1970-71

Would you please send me a one-page statement on the plans for the continuation of Project ABLE during the coming year. Thanks.

126

Project ABLE
THE PUBLIC SCHOOLS OF QUINCY, MASSACHUSETTS AND THE AMERICAN INSTITUTES FOR RESEARCH

August 19, 1970

TO: A. Woodward and W. Phinney

FROM: J. Nicastro

RE: Project ABLE 1970-71

The following is a brief summary of the ABLE plans for the 1970-71 school year.

1. Room 329 is the new ABLE office. There will be five people occupying the room. They will be the Project Coordinator, three persons developing vocational curriculum, and one clerk.

2. $52,000. has been identified by Quincy for the ABLE project. We may expand further, depending upon the Great Cities project or receipt of OE funds. This will allow full-time development in the Power Mechanics and Woodworking areas. As you may recall, Level I is finished in those two technical areas. We will begin Level II development in September.

3. The Project ABLE Coordinator will also serve in another role--that of head of the occupational section of the Quincy Research and Development Unit. In this capacity, he will work on various projects with Quincy in the area of occupational education.

4. Present plans are to provide instructions for all Sophomores (110) in ABLE Power Mechanics and Woodworking (Level I). As Level II materials are developed, they will be field tested with juniors in Woodworking and Power Mechanics, to determine the revisions that are needed. Trying out materials in Level II will, of course, cause some changes in the laboratory areas. In addition ABLE academic materials have been turned over to the high school departments. Plans there are to involve some 1500 students in the use of ABLE developed materials.

Attached are two documents which you may not have received. Attachment #1 is a proposal made during the summer and Attachment #2 contains the approved minutes of a policy board meeting during which the proposal was discussed.

WOODWARD AVENUE, QUINCY MASSACHUSETTS 02169 ☐ (617)773-0686

August 19, 1970

TO: Dr. Lawrence Creedon and the Learning Management Team

FROM: Joseph S. Nicastro

RE: Establishment of Occupational Research and Development Section

1. Project ABLE--1970-71--(Plans) Attachment #1.

   Attached are additional documents which you may not have received. Attachment #2 is a proposal which was made during the summer. Attachment #3 contains approved minutes of a meeting.

2. Steps that need to be taken:

   a. New clerk to be identified and hired. (J. Osterman to determine the procedure for the hiring of a clerk.)

   b. Replacement of persons for Power Mechanics and General Woods laboratories. (J. Osterman to work with L. Babin to assure manning the labs as identified.)

   c. Telephone to be transferred from A.I.R. to Quincy. (S. Moynihan, J. Nicastro, and W. Ullery will work out the details.)

   d. Transfer of some office equipment from A.I.R. to Quincy. (Mr. Daly, J. Nicastro, S. Moynihan, and W. Ullery to work out the details.)

   e. Xerox machine to be cancelled out by September 1, 1970. (S. Moynihan, Mr. Daly, J. Nicastro and W. Ullery to determine the procedures.)

3. Procurement of an occupational research person. (Dr. Creedon, Mr. Daly, J. Osterman, and J. Nicastro to work out details.)

cc: M. Daly
W. Phinney
L. Lofgren
J. Osterman
A. Woodward
L. Babin
S. Moynihan
S. Sargent
Dr. C. L. Griffin
F. Nolan
W. Ullery

WOODWARD AVENUE, QUINCY MASSACHUSETTS 02169 ☐ (617)773-0686

Project ABLE

THE PUBLIC SCHOOLS OF QUINCY, MASSACHUSETTS AND THE AMERICAN INSTITUTES FOR RESEARCH

31 August 1970

TO: L. Babin

FROM: J. Nicastro

RE: Schedule for R. Forsyth (School year 1970-71)

PRIMARY DUTIES

Richard Forsyth to work full-time in the development of the second and third level of Power Mechanics curriculum.

SECONDARY DUTIES

1. To train and assist other Quincy Power Mechanic Instructors, as required--in Project ABLE Lab. (One period each day at the beginning of the year to help whoever mans the Project ABLE Lab.)

2. To train other Power Mechanic Instructors, as required--from the Great Cities Research Council Network, Brazil, etc.

3. To assist the Project ABLE Staff, as required, in other efforts.

QUINCY VOTEC SCHOOL □ QUINCY MASSACHUSETTS 02169 □ (617) 773-0686

1 September 1970

TO: John Osterman

FROM: Joseph Nicastro

RE: Vacancy - Vocational Curriculum Project
Clerk-Typist

Responsibilities: Type and file routine office correspondence under the supervision of Project Coordinator.

Layout and type vocational learning materials as prepared by Project technicians.

Operate IBM Selectric typewriter and reproduction equipment.

Qualifications: Must meet Civil Service requirements.

APPENDIX D

CORRESPONDENCE AND DOCUMENTS RELATED TO
FIELD TESTING OF ABLE CURRICULUM
MATERIALS AMONG GREAT CITY SCHOOLS
AND ES'70 NETWORK MEMBERS

Bethel Home Place, Inc.

Phone 759-7775 Gaston, Indiana 47342

A CHRISTIAN HOME FOR DISADVANTAGED BOYS

July 31, 1970

J. William Ullery, Project Director
Project Able
Woodard Avenue
Quincy, Mass. 02169

Dear Mr. Ullery:

We at Bethel Home work with disadvantaged boys ranging in age from ten to seventeen years who also have IQ's ranging from 60 to 90, or the dull normal range. These boys have had rather misfortunate experiences before coming to the Home. The boys have problems ranging from delinquency to child neglect. All of the boys are public school "rejects".

As of June 1, 1970, a new program was started at the Home. Our boys now have a chance to learn a vocation so they can become a productive member of our society. To date, most of our program is in the embryonic stage. In the next few years, we hope to build our program to the point where we are producing qualified mechanics, landscapers, kitchen staff and many others.

A few months ago, we applied for financial aid for vocational education from the government through Title III. We have been notified that if we could produce a satisfactory curriculum, our grant for automotive mechanics would be accepted.

While researching for this curriculum, I asked Dr. Reams and Dr. Poucher for assistance. Dr. Reams brought my attention to Project Able. I went through the material that Dr. Reams had available and greatly appreciated the work in Project Able. This project coincides with the ideas that the staff of Bethel Home had formulated. Mr. Keller, our executive director, was pleased with the material and told me to contact Project Able to see about obtaining materials, if possible. We all feel that this material will benefit our boys greatly.

During my discussion with you on the telepone on July 29, 1970, the possibility of Bethel Home becoming a field test center for Project Able was discussed. This would be fine with our staff. Perhaps both Project Able and Bethel Home can benefit and our efforts here serve a dual function.

Our staff, including instruction, psychology, counseling, and psychometric, will be very happy to cooperate in charting data, etc. necessary for your information and records.

"Where a boy with problems becomes a man of promise"

We will await your decision. We are pleased to have been made aware of Project Able and eagerly anticipate sharing in the development of same, which we feel will perform a much needed service that will become invaluable to millions of people nation wide.

Thank you for your consideration and time.

Sincerely,

Jack Davidson

Jack Davidson
Vocational Director

Donald W. Keller

Donald W. Keller
Executive Director

ar

Project ABLE
THE PUBLIC SCHOOLS OF QUINCY, MASSACHUSETTS AND THE AMERICAN INSTITUTES FOR RESEARCH

August 10, 1970

Bethel Home Place, Inc.
Gaston, Indiana 47342

Attn: Mr. Jack Davidson and Mr. Donald Keller

Dear Mr. Davidson & Mr. Keller:

The purpose of this letter is to delineate the critical steps which need to be taken to insure, during the school year 1970-1971, the dissemination and appropriate testing of the Project ABLE power mechanics first level instructional system. A similar program will be available in General Woodworking. This letter will also identify the agreements needed on coordination, proper implementation, and appropriate evaluation.

Bethel Home Place, Inc. must take the following action:

1. Identify an instructor who can handle the job (one who is in agreement with the ABLE approach).

2. Send instructor/s to Quincy during the month of September for five days of training.

3. Provide instructor/s with a copy of the appropriate Quarterly Technical Reports and a complete set of materials (performance evaluation units, programmed materials, and learning materials).

4. Begin implementation testing of individual units. Identify those units which would be easy and quick to test and implement. Operationalize the course one unit at a time. Follow procedures for implementation and testing defined in the Fifteenth Technical Report.

5. Order an adequate number of self-scoring response cards.

6. Order at $9.00 per set (or about 1.6¢ per page) an adequate number of sets of materials--one set for each student. Since the Power Mechanics materials will be printed on or about August 21, 1970, any orders for materials must be placed prior to that date. (It would be possible for A.I.R. to reprint on special order at a later date.)

WOODWARD AVENUE, QUINCY MASSACHUSETTS 02169 ☐ (617)773-0686

7. Xerox list of mock-ups, training aids and equipment from the Twelfth Quarterly Technical Report. Xerox list of Tote-Trays. Assign to several teachers, with advanced students, the building and preparation of specific aids. Label and set up as indicated. Do the easy and quick items first to facilitate early testing of modules.

8. Provide for each student, copies of:

   * Occupational Flow Chart and Selected List of Occupations.
   * Job Description and Task Analysis for First & Second Level.
   * Occupational Readiness Record.
   * List of Activities.

   All of the above are from the Twelfth Quarterly Technical Report.

9. Build student tracking system board (a progress chart on pegboard with various colored tags). Diagram and specifications to be provided by ABLE. (See photo in Fifteenth Technical Report.)

Project ABLE Responsibilities:

1. Train instructors in Quincy at no cost to Bethel Home Place. Training will cover management of instructional system and correct use of evaluation instruments.

2. Supply research instruments and data gathering forms (other than trainer-tester response cards and performance evaluation units) at cost of printing.

3. Supply all learning materials at cost of printing.

4. Provide consultant services within the limitations of the ABLE budget and contract.

Bethel Home Place, Inc. Commitments:

1. Pay expenses of staff sent to Quincy for training.

2. Pay for materials at actual cost of printing.

3. Pre-test each unit before implementing system. Follow precisely the procedures provided in the Fifteenth Technical Report.

4. Provide the specified books, references, and manuals. The alternative would be to identify equivalent materials and organize for effective substitution.

5. Provide instructor with at least one period per day of released time for research activities and evaluation data processing.

Your reply to this letter with an indication of agreement and acceptance, should be sufficient to establish this document as a "gentleman's agreement" and contract for the field testing activities.

Very truly yours,

PROJECT ABLE

J. William Ullery

J. William Ullery
Project Director

JWU/bc

cc: Dr. Cieutat
Mr. Nicastro

A CHRISTIAN HOME FOR DISADVANTAGED BOYS

Bethel Home Place, Inc.

Phone 759-7775 Gaston, Indiana 47342

September 2, 1970

Mr. J. William Ullery, Project Director
Project ABLE
Woodard Avenue
Quincy, Massachusetts 02169

Dear Sir:

To confirm my recent conversation with your office, please send materials for 12 students in Project Able, "Power Mechanics." We plan to send our automotive instructor to Quincy for training. After evaluation of the program, at the end of a trial period; our committee will decide whether the materials will be used in the future with our boys here at Bethel Home.

Please find a check in the amount of $198.00 enclosed to cover materials for 12 students.

Sincerely yours,

Donald W. Keller

Donald W. Keller, Executive Director

DWK:mw
enc.

"Where a boy with problems becomes a man of promise"

February 5, 1970

Mr. Stewart Sargent
ES '70 Corrdinator
Mr. J. Wm. Ullery
Project Director and
Associate Research Scientist
Project ABLE
Quincy VOTEC School
Quincy, Mass. 02169

Dear Mr. Sargent and Mr. Ullery:

The purpose of this letter is to confirm and to qualify our discussions and agreements on the cooperative dissemination and testing of Project ABLE instructional systems.

The major objectives are as follows (not ordered):

1. Establish immediately (February 1970), a cooperative operational curriculum development, dissemination, and testing effort among three ES '70 school systems (Quincy, Baltimore and Philadelphia) in one course area. (Expansion to other network members can be considered after initial negotiations are completed and operational problems brought under control.)

2. Establish guidelines and procedures to set up the machinery for the dissemination and testing of the Project ABLE general woodworking core program and the ABLE electronics programs for implementation Spring of 1970.

3. Identify givens, conditions, and criteria for the development by each system (Quincy, Baltimore and Philadelphia) of specific instructional systems components (e.g. power mechanics). This will be accomplished through an administrative arrangement for the joint development, dissemination and testing of such components. (Components are also defined as those key operational elements, described in the paper presented by Mr. Ullery at AVA, for the establishment of the kind of individualized programs congruent with the ES '70 and Project ABLE philosophy.)

4. Disseminate, field test and appropriately evaluate the first level power mechanics program (within the guidelines established in the Project ABLE Validation and Evaluation Plan).

5. Establish an exemplary program involving local, state and teacher training institutions in a manner suggested in the "Model Proposal" for the first level power mechanics program and to establish the framework for other such programs.

6. Validate the developmental, evaluation and managerial procedures established in the Validation and Evaluation Plan for Project ABLE.

Because it is critical that action be taken immediately on the power mechanics dissemination and testing, the Model Proposal will become a concurrent activity which may or may not require outside funding (a local option). Action on Objective #1 has already been initiated. A subsequent letter will detail our agreements and procedures on this matter. Action on #6 will, in part, be achieved in the proper field testing of the power mechanics program and the implementation of Objectives #2 and #3.

Respectfully,

George H. Love
ES '70 Coordinator

William T. Kelly
Director of Vocational Education

cc: Dr. Mark R. Shedd
Dr. Thomas D. Sheldon
Mr. Samuel Sharrow
Dr. Benjamin Whitten
Dr. Hugh Livingston
Mr. Eliot G. Spack
Dr. Lawrence P. Creedon
Mr. Maurice J. Daly
Mr. J. S. Nicastro

Project
ABLE
THE PUBLIC SCHOOLS OF QUINCY, MASSACHUSETTS AND THE AMERICAN INSTITUTES FOR RESEARCH

February 17, 1970

Dr. William T. Kelly
Director, Vocational Education
734 Schuylkill Avenue
Philadelphia, Pennsylvania 19146
&
Mr. George H. Love
ES'70 Coordinator
School Dist. of Philadelphia
21st and Parkway, Room 208
Philadelphia, Pennsylvania 19103

Dear Dr. Kelly and Mr. Love:

We have received both of your letters dated February 5th, 1970 delineating our discussion on cooperative testing and possible joint development of Project ABLE programs. The statements are acceptable to Quincy and A.I.R., and should provide a workable set of agreements and procedures for the initiation of "...this most unique joint and cooperative effort". The detail of the letters and the procedures set forth in the "Project ABLE Checklist of Instructor Performance", along with the instruments being developed for the "Project ABLE Validation and Evaluation Plan for Instructional Systems Development" should insure an appropriate test of the Power Mechanics program.

Sincerely,

PROJECT ABLE

Stewart S. Sargent
ES'70 Coordinator, Q.P.S.

J. William Ullery
Project Director and
Associate Research Scientist, A.I.R.

cc: Dr. Creedon
Mr. Daly
Mr. Nicastro
Dr. Flizak
Dr. Whitten
Mr. Sharrow

QUINCY VOTEC SCHOOL □ QUINCY MASSACHUSETTS 02169 □ (617) 773-0686

DIVISION OF
SECONDARY, VOCATIONAL
AND ADULT EDUCATION

BALTIMORE CITY PUBLIC SCHOOLS
THREE EAST TWENTY-FIFTH STREET
BALTIMORE, MARYLAND 21218
TELEPHONE HOPKINS 7-4000

February 24, 1970

Mr. J. William Ullery
Project Director and Associate Research Scientist
Project ABLE
Quincy VOTEC School
Quincy, Massachusetts 02169

Dear Mr. Ullery:

The purpose of this letter is to delineate the steps which Baltimore will take in implementing the Project ABLE power mechanics first level instructional system. This letter will also attempt to qualify and confirm our discussions and agreements on coordination, proper implementation and appropriate evaluation.

Baltimore is taking the following action:

1. Two schools have been designated as testing sites for the program, Edmondson Sr. H.S. - Mr. William C. Stinchcomb, instructor, and Carroll Park Jr. H.S. - Mr. Ben D. Stout, instructor. Edmondson Sr. H.S. is a comprehensive high school, and Carroll Park is a special education school. Once the program has been properly evaluated at the testing sites, consideration will be given to implementing the program at other schools.
2. Mr. Theodore Rybka, Vocational Education Specialist will accompany Messrs. Stinchcomb and Stout to Quincy on the 25th of February to study the program more thoroughly. They will remain for three days of training.
3. Our instructors have been provided with complete sets of materials (performance evaluation units, programmed materials and learning materials). When the Twelfth Quarterly Technical Report is available, our instructors will receive a copy.
4. As soon as the training aids can be developed, our instructors will begin testing individual units. The initial efforts will take place during the month of March. Hopefully the entire course will be operational prior to the end of the school year.
5. An adequate number of self-scoring response cards will be ordered upon determination of the number needed.
6. Students in the program will receive copies of:
   a. Occupational Flow Charts and Selected List of Occupations.
   b. Job Description and Task Analysis for first and second level.
   c. Occupational Readiness Record
   d. List of Activities

7. To assist the instructor in keeping current with the progress of his students, a tracking system board (a progress chart on pegboard with various colored tags) will be constructed. Project Able will provide a diagram and specifications.

Project Able Responsibilities:

1. Training of instructors, in Quincy, at no cost to Baltimore. Training will cover management of instructional system and correct use of evaluation instruments.
2. Supply research instruments and data gathering forms (other than trainer-tester response cards and performance evaluation units).
3. Analysis of research data and modification of materials.
4. Provide a copy of the Validation and Evaluation Plan Publication (draft now being reviewed by consultants) to ES'70 Coordinator, Director of Vocational Education, and each instructor trained for the program. (Additional copies will be made available at cost).
5. Provide consultant services within the guidelines of the ABLE budget and USOE contract.
6. Provide sets of instructor checklists for validation activities.

Baltimore Commitments:

1. Pay expenses of staff sent to Quincy for training.
2. Pay for materials at actual cost of printing.
3. Pre-test each unit before implementing system.
4. Provide for specified books, references, and manuals. The alternative would be to identify equivalent materials and organize them for effective substitution.
5. Schedules for this semester are already in operation, but we will do our best to provide instructors with one period per day of released time for research activities and evaluation data processing. Provide instructors with three periods per day for testing untis with groups of students (about 9 or 10 to 1 ratio, during initial tests stages).
6. Implement and follow procedures delineated on checklist of Instructor Performance.

Through our local ES-70 office an effort will be made to secure travel funds for one or two on-site visits by the ABLE Project Director (with no fee to be charged for services).

Your reply to this letter with an indication of agreement and acceptance, should be sufficient to establish our relationships and responsibilities in this cooperative effort.

Sincerely yours,

Benjamin Whitten

Benjamin Whitten
Area Superintendent, Vocational Education

copy: Dr. Vernon Vavrina
Dr. Wilmer Bell
Mr. Samuel Sharrow

DIVISION OF
SECONDARY, VOCATIONAL
AND ADULT EDUCATION

BALTIMORE CITY PUBLIC SCHOOLS
2521 NORTH CHARLES STREET
BALTIMORE, MARYLAND 21218

July 9, 1970

Mr. I. William Ullery
Project Director
Project Able
Quincy Voc.-Tech. H.S.
Quincy, Massachusetts 02169

Dear Bill,

Prior to the end of the school year I was able to see Ben Stout and Bill Stinchcomb. We had time to discuss Project Able at length and our plans for the 1970-71 school year.

Bill feels that he will have all of his units ready to go by the first of October. The only major items he lacks are the film loops and projector. Mickey Sharrow has indicated that he will use his funds for these items and requisitions are being prepared for him now.

I'm a little concerned about Ben's shop. Last year was the first year of its operation. Unfortunately, as with many new facilities, much of his materials and tools didn't arrive. This has resulted in some confusion in his program and progress with Project Able. The engines that were ordered for his shop arrived the last week of school. We can't determine whether they are operational until they have been mounted, hopefully prior to the fall term.

On top of all of this, I will be leaving on sabbatical leave starting the last week of July. My replacement will be Paul Harris. Paul has just finished his sabbatical leave, having been to Stout State where he received his Educational Specialist Certificate. I'm sure Paul will do well in my place.

Dr. Whitten had a meeting with Mr. Pruitt concerning funding for Project Able. He is to meet again July 23rd and 24th, and has asked me to go along. I hope that things go well, as I am anxious to see the joint effort become a reality.

I'll keep in touch with you to see how things are going. Since I'll be at the University of Connecticut, I will try to see you in Quincy sometime.

Take care Bill, and good luck with Project Able.

Sincerely,

Ted

Theodore F. Rybka
Specialist
Vocational Education

TFR:sb

TELEPHONE, KI 6-8505

THE SCHOOL DISTRICT OF PHILADELPHIA
BOARD OF EDUCATION
DIVISION OF VOCATIONAL EDUCATION
JOHN F. KENNEDY CENTER FOR VOCATIONAL EDUCATION
734 SCHUYLKILL AVENUE
19146

MARK R. SHEDD
SUPERINTENDENT OF SCHOOLS

WILLIAM T. KELLY
DIRECTOR

AGRICULTURE
HOME ECONOMICS
INDUSTRIAL ARTS
MANPOWER DEVELOPMENT AND TRAINING
UNEMPLOYMENT RETRAINING
TRADE AND INDUSTRIAL

March 2, 1970

Mr. William Ullery, Director
Mr. Joseph Nicastro, Coordinator
Project Able
Quincy Vocational-Technical School
Quincy, Mass.

Dear Bill and Joe;

On behalf of Tony, Charlie and myself, I want to thank both of you for the chance to immerse ourselves in your operation for a few days. As I said to Bill on our way to the airport, what I saw of Project Able has provoked me to rethink much of my own approach to educational programming. I see an opportunity here for meaningful, measurable progress on the part of many of the students served by Philadelphia's occupational education programs.

I plan to begin relating my observations to Dr. Kelly this afternoon so that we can move ahead with our field testing efforts as soon as possible. We'll be in touch again soon.

Sincerely,

Steve Tracy

TELEPHONE, KI 6-8503

THE SCHOOL DISTRICT OF PHILADELPHIA
BOARD OF EDUCATION
DIVISION OF VOCATIONAL EDUCATION
JOHN F. KENNEDY CENTER FOR VOCATIONAL EDUCATION
734 SCHUYLKILL AVENUE
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AGRICULTURE
HOME ECONOMICS
INDUSTRIAL ARTS
MANPOWER DEVELOPMENT AND TRAINING
TRADE AND INDUSTRIAL
UNEMPLOYMENT RETRAINING

April 3, 1970

Mr. William Ullery
Director, Project ABLE
Quincy Vocational-Technical School
Quincy, Massachusetts 02169

Mr. Theodore Rybka
Specialist, Vocational Education
2521 North Charles Street
Baltimore, Maryland 21218

Dear Bill & Ted;

Enclosed are copies of the minutes of the sessions that Tony, Charlie, and I have had since my last ABLE progress report.

This morning, I met with Philadelphia's ES'70 Coordinator and brought him up to date on our field testing progress. He was interested in the implications that Project ABLE might have for the program of the new ES'70 High School, which is to commence operations sometime this Fall.

On Monday, April 6th, Tony, Charlie, and I will meet to draw up final specifications for tools and materials required for implementation of the ABLE learning units. On the following Monday, we will meet with a representative of the Educasting Company to discuss the production of single-concept slide-tapes and film loops designed specifically to facilitate the comprehension of the ABLE learning units. Most of the existing materials, we have found, do not lend themselves readily to this kind of application. Cooperation among the three school systems would probably be advantageous in this area, as any productions financed by one district should be directly applicable to the Power Mechanics program in the other districts.

I'll be writing again in a couple of weeks.

Sincerely,

Stephen Tracy

SCHOOL DISTRICT OF PHILADELPHIA
Division of Vocational Education

Project ABLE Power Mechanics
Field Testing of Six Learning Units

Summary of Meeting of 3/16/70 -- Mastbaum Technical High School

Mr. Dienno, Mr. Fareira, Mr. Sabaroff, Mr. Tracy

1. Mr. Sabaroff presented new Snap-on tool catalogues and offered to assist us with the writing of specifications for any of the mock-up or tote tray equipment that we will need to purchase. We will provide him with a set of learning units, indicating the materials that we have already aquired, and he will locate the remaining equipment.

2. Steve Tracy gave a brief report on his progress since the 3/9/70 session:
   a. 40 copies of the "Checklist of Instructor Performance" are being run off at the Kennedy Center;
   b. 20 sets of learning units and performance evaluations are on order from Quincy;
   c. 90 sets will be ordered for the '70 - '71 school year;
   d. Bill Ullery may plan a visit in late April or May.

3. Charlie Fareira reported on progress at West Philadelphia High School:
   a. materials for Learning Unit 6-2 (Remove & Replace Headlamps) nearing completion (tote tray and movable mock-up board assembled);
   b. tote trays and mock-ups for other units at various stages of completion (needs used battery for Unit 9);
   c. needs two (2) Super-8 film loop projectors;
   d. using his own shop general fund for small purchases until Project ABLE fund established;
   e. no significant administrative or space problems at this time.

4. Tony Dienno reported on progress at Mastbaum:
   a. staff reaction to the ABLE program was about half positive, half negative (many don't think it can be done with a student load of 24);
   b. the service shop teacher has convinced Mr. Sussman not to divert space from his operation to Project ABLE use -- instead, ABLE will use the tool crib adjacent to the chasis shop, and will have access to two lift areas for "live work" (Tony did not feel that pressure should be exerted from JFK in order to secure space in the service shop -- this space hopefull will be made available for the Fall, after ABLE has begun to prove itself);

c. for two periods, ABLE will have the crib and the lift areas to itself; for the third period, the lift areas will have to be shared with the chasis shop students;

d. given the small amount of available space, mock-ups will have to be movable;

e. by mid or late April, Tony hopes to have a limited ABLE program in operation with seven or eight learning units and five or six students -- he will get the release time to do this;

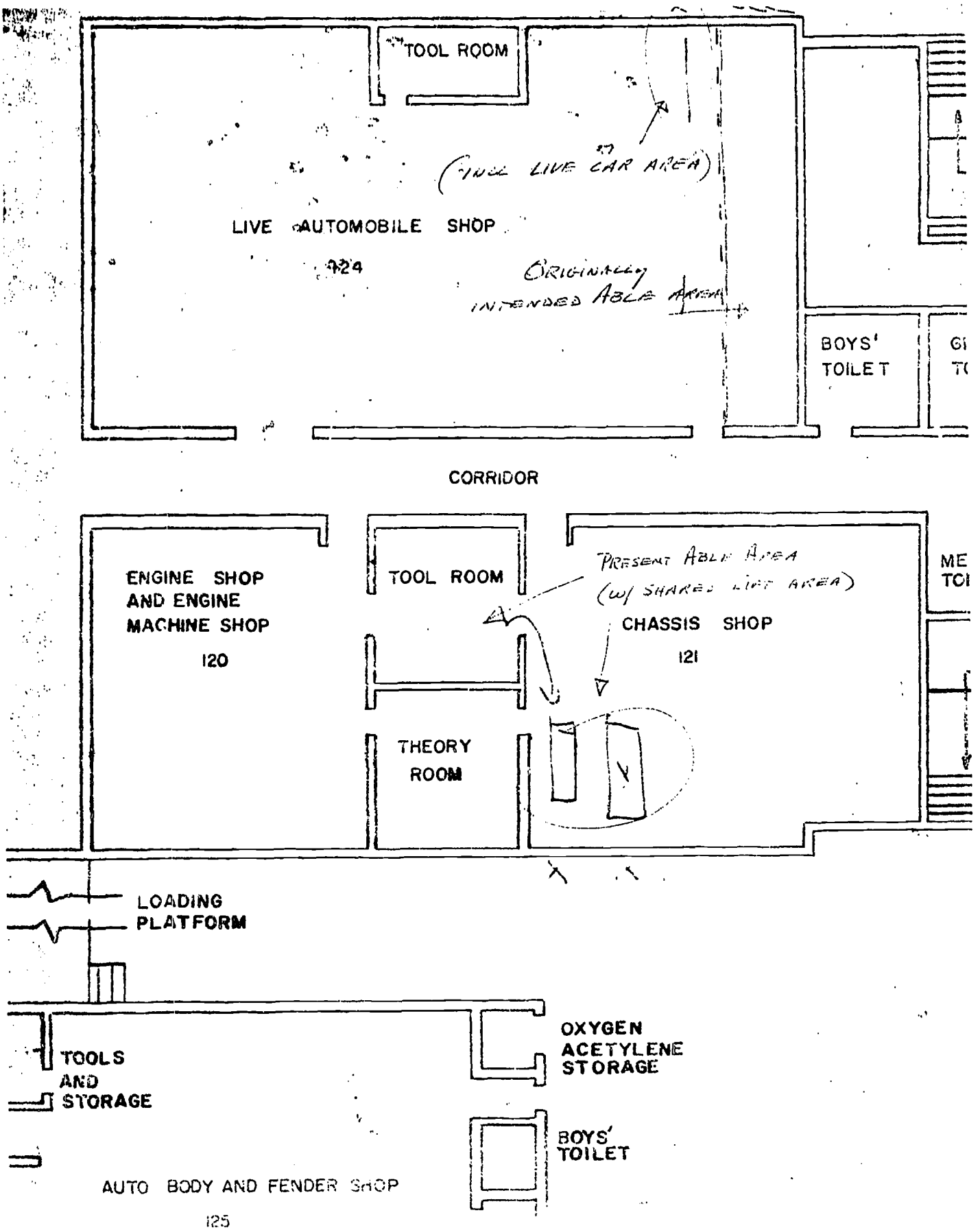
f. the students for next Fall's ABLE program will not be regular 10th graders, but students who failed the regular 10th grade program this year;

g. Tony has sent away for a new film loop catalogue -- he will require one (1) Cuper-8 film-loop projector for the program.

5. It was estimated that 50 Group Characteristics forms would be needed for the testing program; also, each teacher would like 10 copies of the graduate questionaire so that they can send them out to students already on the job.

6. Tony and Charlie discussed possible pieces of equipment that they might be able to supply each other with.

7. The rest of the session was spent looking over Mastbaum's Automobile Shop facilities, particularly those earmarked for use by Project ABLE (see floor plan attached).


TOOL ROOM
(FINAL LIVE CAR AREA)
LIVE AUTOMOBILE SHOP
124
ORIGINALLY INTENDED ABLE AREA
BOYS' TOILET
CORRIDOR
ENGINE SHOP AND ENGINE MACHINE SHOP
120
TOOL ROOM
PRESENT ABLE AREA (W/ SHARED LIFT AREA)
CHASSIS SHOP
121
THEORY ROOM
LOADING PLATFORM
TOOLS AND STORAGE
OXYGEN ACETYLENE STORAGE
BOYS' TOILET
AUTO BODY AND FENDER SHOP
125
150

SCHOOL DISTRICT OF PHILADELPHIA
Division of Vocational Education

Project ABLE Power Mechanics
Field Testing of Six Learning Units

Summary of Meeting of 4/1/70
Mastbaum Area Vocational-Technical School
Mr. Dienno, Mr. Fareira, and Mr. Tracy

1. Steve Tracy distributed copies of the instructor check lists to Tony and Charlie. Each copy will be labled with the title of a particular learning unit. Steve will visit the two shops at the request of the teachers to initial the lists as preparations progress. The first such visit to West Philadelphia High School will take place this Friday afternoon. Progress on Tony's shop at Mastbaum will be noted sometime during the week of April 6.

2. Tony and Charlie presented rough copies of their lists of supplies and materials that will be needed for the program. Completed lists will be ready for our April 6 meeting.

3. Audio-visual materials for the ABLE testing program were discussed. Tony is still awaiting receipt of film loop catalogues from a couple of companies. Steve reported that the D.C.A. film loops on auto mechanics that he had reviewed were "too heavy" for the purposes of Project ABLE. He will meet with a representative of the Educasting Company to explore the possibility of having slide-tape materials developed especially for ABLE.

4. The next meeting will take place at the John F. Kennedy Center at 2:30 on April 6th. First order of business at that time will be to refer to suppliers catalogues for specifications and prices of materials needed for the program. A list of items required from Snap-On will be sent directly to the Snap-On representative with whom we have been working.

APPENDIX E

SAMPLE MODULE--LEARNER ACTIVITY GUIDE AND PERFORMANCE EVALUATION SET

PERFORMANCE EVALUATION SET
& LEARNER ACTIVITY GUIDE

POWER MECHANICS

FAMILY: AUTO MECHANICS & RELATED OCCUPATIONS
EXIT LEVEL: SERVICE STATION ATTENDANT & RELATED OCCUPATIONS

CHASSIS LUBRICATION
PE 11-6

Project ABLE
Quincy Public Schools
American Institutes for Research

PERFORMANCE EVALUATION SET & LEARNER ACTIVITY GUIDE

POWER MECHANICS

Family: Auto Mechanics & Related Occupations.
Exit Level: Service Station Attendant & Related Occupations.

(915.867)
LEVEL I

CHASSIS LUBRICATION
PE 11-6

TASK 12 C. O. 1 & 2

NAME _____

DATE _____

LEARNER ACTIVITY GUIDE

PREREQUISITES: PE 3-1 and PE 11-1 through 11-5

OBJECTIVES: Given an auto to be lubricated, you will:

1. Use a service manual lube chart to locate and clean lubrication points in front suspension, steering linkages, drive and power lines, cables and linkages, etc.

2. Identify the proper tools and adapters and apply the specified type and amount of lubricant without dirt or foreign materials entering the system. Follow the lubrication chart directions for the specific make, model, and year of car.

3. Check lubricant level in differential, manual transmission, manual steering gear, and power steering reservoir. Identify proper lubricant.

4. Identify and lubricate to specifications, various under-the-hood lubrication points.

(Continued)

PROJECT ABLE

OVERVIEW: Most cars and trucks have lube points on the underbody which are exposed to rugged operating conditions. The steering and suspension systems, with ball joints and bearings, are the major underbody lube points. Careful servicing is important. While older vehicles are equipped with grease "fittings" for such joints, most new cars are now sold with pre-packed bearings. The servicing interval for most fitting-equipped points is from 1,000 to 4,000 miles. The recommended servicing interval for pre-packed bearings ranges from 12,000 miles to 36,000 miles (or from 12 months to 36 months). You must know that the method of lubrication is different for the two types. Greasing a pre-packed bearing like those equipped with standard fittings could ruin the bearing seals. Furthermore, a different type of grease is usually required. Chassis lubrication is one job you should not attempt without the careful supervision of the instructor or mechanic.

STUDENT-INSTRUCTOR CONTRACT OPTIONS:

- ☐ 1. Student-instructor conference.
- ☐ 2. Learning Unit #11-6.
- ☐ 3. Chek-Chart's Car Service, Chek-Chart Corporation, pp. 49-54.
- ☐ 4. Other--specify: _____.

EQUIPMENT: Tote-Tray #11-6 with lube chart manual, penetrating fluid, oil can with 10W30 oil, hand lubrication gun, adapters for pre-packed bearings, and assorted wrenches. Get some paper towels.

POWER MECHANICS Family: Auto Mechanics & Related Occupations. Exit Level: Service Station Attendant & Related Occupations. (915.867) LEVEL I

CHASSIS LUBRICATION PE 11-6

TASK	C. O.
12	1 & 2

NAME _____

DATE _____

Pre Assessment

Instructions;

(1) Fill in name and date on the last two pages. When you have completed the performance evaluation, you will get one copy, the instructor will file the other.

(2) Do the training check questions below and give answer card to instructor.

(3) Complete the performance evaluation under instructor's supervision. He must see proof of your performance.

TRAINING CHECKS: T-T No. Z-11. The correct answer is **L**. Start with number **17.**

17. Dirt must be removed from fittings and plugs

a. to make a path for excess grease.
b. to prevent foreign materials from entering bearing.
c. to see the bearing.
d. to present a neat appearance.

18. To remove the grease gun from a fitting after greasing the lube point

a. unscrew fitting.
b. pull straight off.
c. break by moving up, down, or sideways.
d. pull trigger and pop out.

19. Limited slip differentials can always be detected by

a. checking drain plug for metal tag.
b. checking manual for specifications.
c. checking special type of grease in differential.
d. rotating a rear wheel and observing opposite wheel.

20. The service interval for bearings with standard fittings and for pre-packed bearings is

a. much longer for pre-packed bearings.
b. determined by the mechanic.
c. longer for the standard fitting equipped bearings.
d. about the same.

21. The pressure gun

a. can be used on pre-packed bearings by changing only the grease.
b. can be used on pre-packed bearings with no modifications.
c. should not be used on pre-packed bearings.
d. should not be used unless the nipples are changed.

22. Limited slip differentials

a. use a different grease than used in standard differentials.
b. use the same grease furnished for standard differentials.
c. are serviced the same as any other differential.
d. require no special care.

23. The lubricant for manifold heat-control valves should be

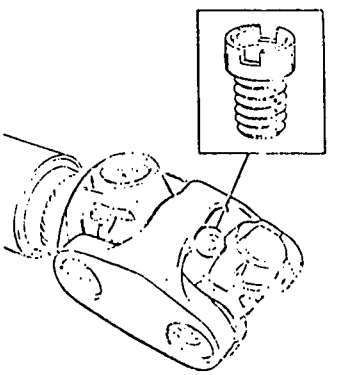
a. Door-Ease or silicon spray.
b. penetrating fluid or similar lubricant.
c. flake graphite.
d. SAE 20 oil.

Identify the following (put a check mark next to the correct letter)

24. Standard nipple plug.

a. _____
b. _____
c. _____

b.



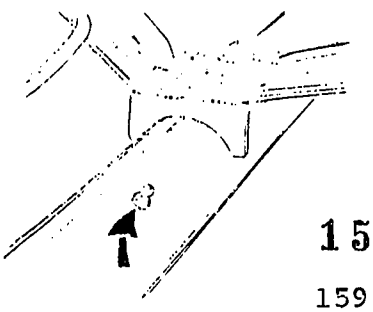
25. Pre-packed bearing plug.

a. _____
b. _____
c. _____

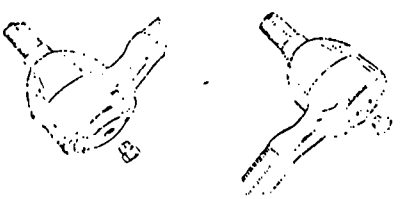
26. Flush type plug.

a. _____
b. _____
c. _____

c.



a.



27. When the lubricant in a differential, steering reservoir, or transmission is very low, you should

a. recommend the owner return it at a later time for service.
b. recommend draining and refilling unit with new fluid.
c. simply fill to proper level with specified lubricant.
d. add gear grease.

28. Vehicles should be allowed to warm up indoors before greasing when the temperature approaches

a. 0°F.
b. -10°F.
c. +10°F.
d. +20°F.

29. When attaching grease gun to fitting,

a. push straight onto fitting.
b. touch lightly and apply grease.
c. pull trigger and shove.
d. place on angle and roll on.

30. Most new cars are sold with

a. pre-packed bearings for most front-end lube points.
b. standard grease fittings for most lube points.
c. standard grease fittings for all lube points.
d. standard nipple plugs for most lube points.

31. Standard fittings and pre-packed bearings

a. require the same type of grease.
b. differ only in the service interval.
c. are serviced with the same tools and fittings.
d. require a different type of grease.

32. Greasing either pre-packed bearings or bearings equipped with standard fittings.

a. is recommended procedure.
b. could ruin the bearing seals.
c. requires essentially the same tools but different grease.
d. requires essentially the same grease but different tools.

STOP _____ INSTRUCTOR CHECK #1
initials

POWER MECHANICS
Family: Auto Mechanics & Related Occupations.
Exit Level: Service Station Attendant & Related Occupations.
(915.867)
LEVEL I

CHASSIS LUBRICATION
PE 11-6

TASK 12 C. O. 1 & 2

NAME _____
DATE _____

PERFORMANCE ACTIVITY
(Pre and/or Post Assessment)

UNIT OBJECTIVE 1: Using a service manual lube chart, locate and clean lubrication points in front suspension, steering linkages, drive and power lines, cables and linkages, springs, etc.

A. _____ year _____ make _____ model _____ mileage

When was the vehicle last greased? _____ miles _____ date

B. What is the recommended lubrication service interval?

_____ miles _____ months

Does the mileage or time interval indicate the need for greasing? _____

C. How many plugs are listed? _____
How many fittings are listed? _____
What type of plugs or fittings are listed?

_____
_____
_____

#33. Do all plugs and fittings require the same type of lubricant?
a. No b. Yes

D. Complete the following information:

Differential

Type _____

Service Interval _____

Lubricant _____

Is service required? _____

Transmission-Overdrive (or Automatic Transmission)

Type _____

Service Interval _____

Lubricant _____

Is service required? _____

Steering

Type _____

Service Interval _____

Lubricant _____

Is service required? _____

E. Raise vehicle following procedures listed in unit on lifts and jacks.

F. Prepare the plugs for greasing--do NOT grease until after the instructor check below.

What type plug or fitting is used? _____

Were the plugs changed? _____

Were the plugs originally of the pre-packed type? _____

UNIT OBJECTIVE 2:	Identify the proper tools and adapters and apply the specified type and amount of lubricant without dirt or foreign materials entering the system. Follow the lubrication chart directions for the specific make, model, and year of car.

A. Get the hand gun. It should be filled with the lubricant specified for pre-packed bearings. Is it the type of lubricant specified by the manual? _____ Do NOT grease anything yet.

#34. Get the pressure gun. Does it have the type of lubricant specified for standard nipple-type fittings?

a. No b. Yes

NOTE: The pressure system has the wrong type of grease for pre-packed bearings. NEVER use the pressure gun on sealed pre-packed bearings. The pressure would break the seals--this could void the warranty.

NOTE: No student (10th, 11th, or 12th grade) is allowed to grease fittings without first having the job inspected by the instructor.

STOP _____
initials

INSTRUCTOR CHECK #2:
Check written work. Check identification of fittings. Student must be able to identify pre-packed bearings. Make certain he has identified and cleaned all lube points. Check for limited slip differential. Have student identify plugs on differential and transmission. Have student demonstrate use of hand gun and pressure gun. Watch him perform. Make certain he keeps fittings and nozzle VERY clean. Have student demonstrate turning of wheels while greasing ball joints or king pins.

B. Do NOT attempt to grease a universal joint or drive shaft without instructor's assistance. Lubricate the first few points with instructor's help.

C. Lubricate all fittings and plugs as indicated on chart. Use proper lubricant.

UNIT OBJECTIVE 3:	Check lubricant level in differential, manual steering gear, power steering reservoir, and manual transmission-overdrive unit.

Differential

A. What type of lubricant is specified for the standard differential? _____ What type of lubricant is specified for the limited slip differential? _____ (Check the service chart for some other make of car if both are not listed for the vehicle you are servicing.) Does the vehicle have a limited slip differential? _____

B. Find and prepare plug--do NOT remove until checked by instructor.

STOP _____ initials

INSTRUCTOR CHECK #3:
Have student remove plug, check level, and replace plug. Did student inspect for leaks and broken seals?

C. Is lubricant required? _____ Fill only by permission of instructor.

NOTE: Do not lower car to ground until instructor checks plug.

Manual Transmission

#35. What type of lubricant is specified?

a. A.T.F.
b. SAE 90-140
c. SAE 10W30
d. SAE 30

A. Find and prepare plug.

NOTE: Do not remove fill plug until checked by instructor. Should the car you have been servicing have an automatic transmission, go to another vehicle for this part of the project.

STOP _____ initials

INSTRUCTOR CHECK #4:
Have student remove plug, check level, and replace plug. Did student inspect unit for leaks?

B. Is lubricant required? _____
Fill only by permission of instructor.

Steering Gear (units without power steering)

#36. What type of lubricant is specified?

a. Chassis lube

b. A.T.F.

c. SAE 10W

d. SAE 90-140

A. Find and prepare plug.

STOP _____ initials

INSTRUCTOR CHECK #5:
Have student loosen fill plug, check fluid level, and replace plug.

B. Is lubricant required? _____

Do not add lubricant without instructor's or mechanic's permission.

Power Steering Reservoir

#37. What type of lubricant is specified?

a. A.T.F.

b. SAE 10W

c. SAE 10W30

d. SAE 90-140

A. Find and prepare cover or fill cap.

Some older cars with power steering have two separate lube points: (1) the power steering unit reservoir and (2) the steering gear box. In new vehicles, the power steering reservoir supplies the gear box with lubricant. Your instructor can explain this.

B. Remove cap and check level. Is lubricant required? _____

Fill only by permission of instructor.

UNIT OBJECTIVE 4:	Identify and lubricate, to specifications, various under-the-hood lubrication points.

Manifold Heat-Control Valve

#38. What is the specified lubricant?

a. SAE 30

b. A.T.F.

c. Penetrating oil

d. SAE 90-140

A. Lubricate.

Throttle Linkage

A. What is the specified lubricant? _____

B. Point out lube points to instructor--from manual.

C. Lubricate.

Other Accessories

A. List four (4) other lubrication points listed in manual. (Points not covered in this project.)

1. _____
2. _____
3. _____
4. _____

STOP _____ initials

INSTRUCTOR CHECK #6:
Check steps in power steering, manifold heat-control valve, throttle linkage, and "other accessories".